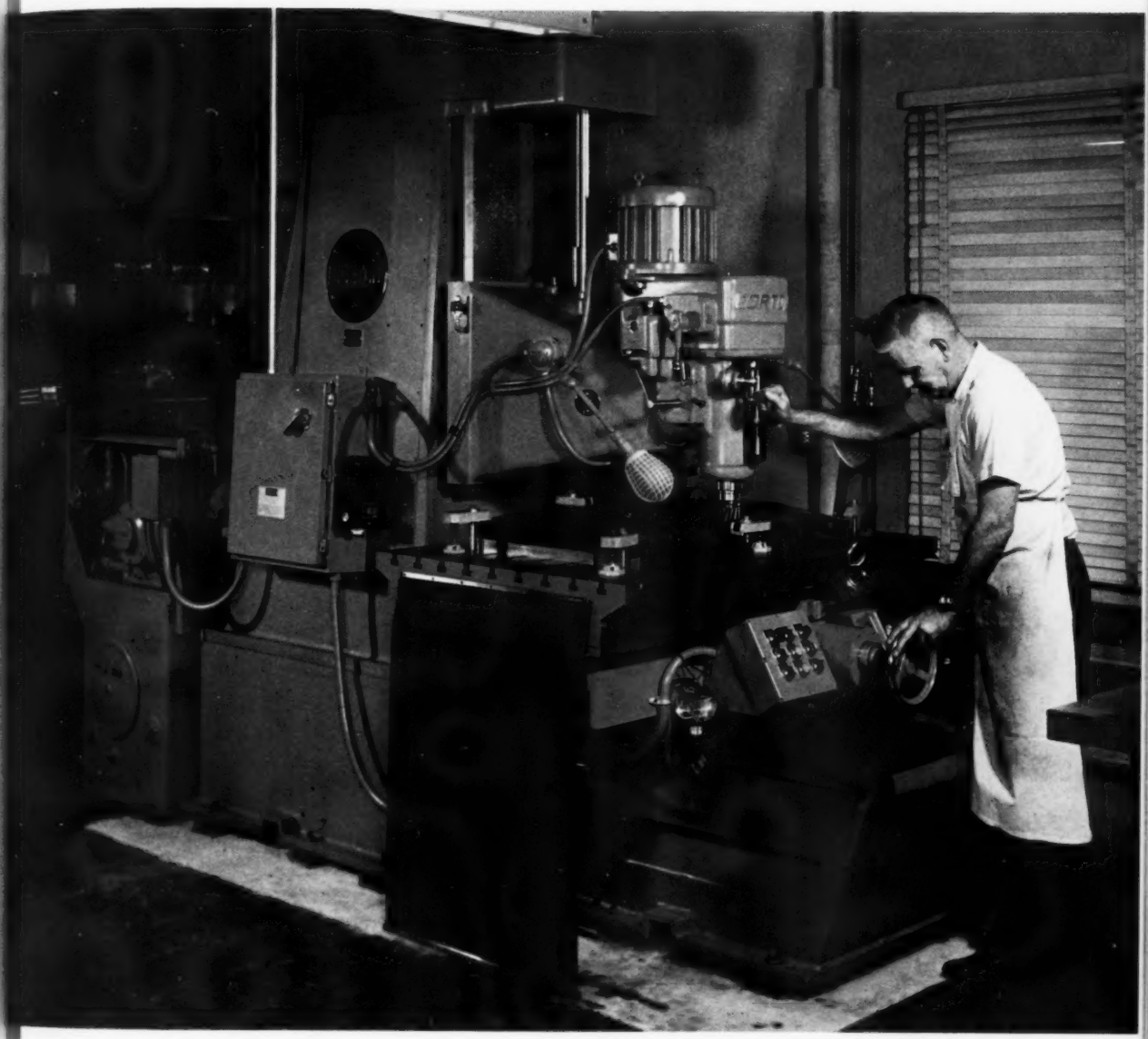
TOOLING & PRODUCTION

AUGUST 1960

The Magazine of Metal Working Methods



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CHICAGO SHOWS
page 58

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TOOLING & PRODUCTION Magazine

VOL. XXVI, No. 5

AUGUST 1960

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BPA

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AUGUST 1960
VOL. XXVI, No. 5
GEORGE J. HUEBNER, Founder
1885 - 1956

personally speaking...

Dear T & P Reader:

News releases about the products which will be exhibited at the three Shows in Chicago in September have been reaching us in increasing quantities during the past couple of weeks. From what we've seen so far, we can guaranty that any time you spend at the Chicago Shows will be tremendously interesting and probably highly worthwhile.

In this issue of T & P you will find not only a story previewing the Shows but also some show products. Our September issue which will mail about August 19th, will be loaded with product descriptions.

If you are going to the Shows, make some notes of things you want to be sure to see as you read about these products in our August and September issues. If you haven't made plans to attend these Shows, we strongly urge you to do so. The Machine Tool Show especially is a must because of the new production techniques that will be disclosed through the many displays of tape controlled machining.

And speaking of tape control, we just learned something interesting about a new contract manufacturer being set up in California. He will be equipped with tape controlled manufacturing machines, and probably all you would have to do to get some parts made by this outfit would be to furnish a punched tape and an order.

This issue has several articles that I would like to call to your attention. One of these features Ceramics and the gains in production that were achieved through their use. This story comes out of the Indianapolis plant of the Adams Division of LeTourneau-Westinghouse.

Then if you like a mathematical challenge read the article by R. J. Rahn on the "Geometry of a Sphere — Checking Surface Plate Flatness."

There's another article on machining that you won't want to miss. It is by Donald Tiffany and it deals with the subject of "More Precise Holes at Less Cost per Hole by Reaming with Solid Carbide."

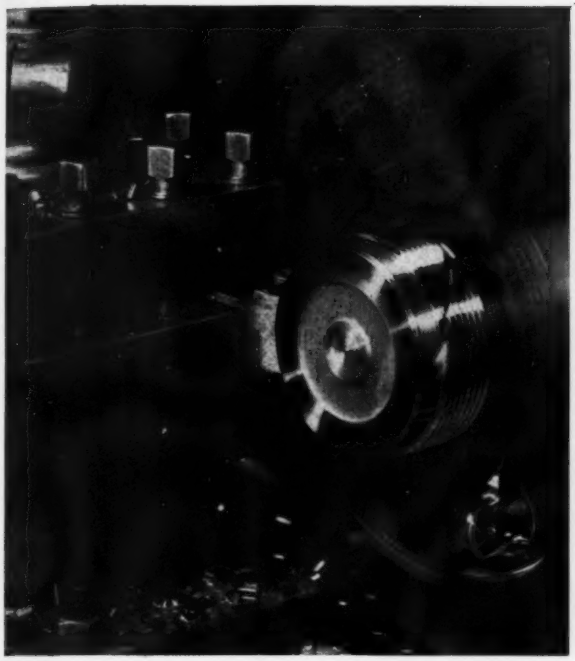
And after you have read this issue, let us have your answer to the question on the Inform-A-Gram card which says: "Which article in this issue was of most interest to you?"

Cordially yours,

Ray Huebner

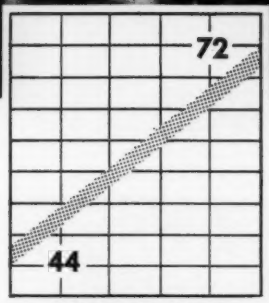
Publisher

V-R CUTS threads faster CUTS costs 83%

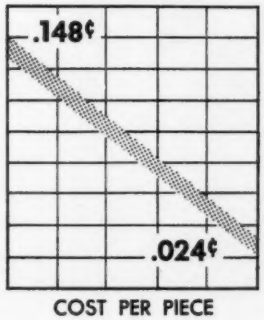


NEW IDEA at MISSION

MISSION MANUFACTURING CO., Houston, Texas, manufacturers of oil field and industrial equipment, now cuts threads using negative rake throw-away tooling with standard precision VR-73 inserts. Production has increased from 44 to 72 pieces per 8 hour shift. Threading tool costs have been cut 83% — from .148¢ to .024¢ per piece. Carbide grade VR-73 produces 3 times the pieces per cutting edge. The throw-away feature allows accurate indexing without tool changes and costly set-ups. These benefits are not obtainable with the previously used brazed tool. This new idea in tooling has also given Mission greater accuracy, improved finish and more consistent production. *Call your V-R man today. Write for fully illustrated catalog.*



PIECES PER SHIFT



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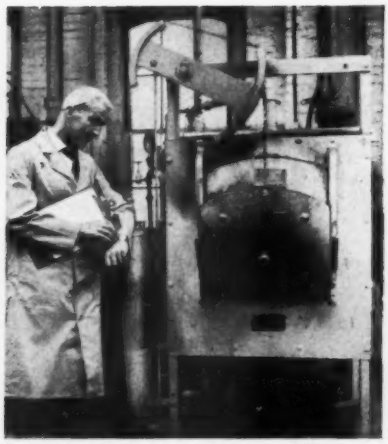

The man who heat treats many different tools..

can realize major savings with Crucible's new Tool Steel Service.

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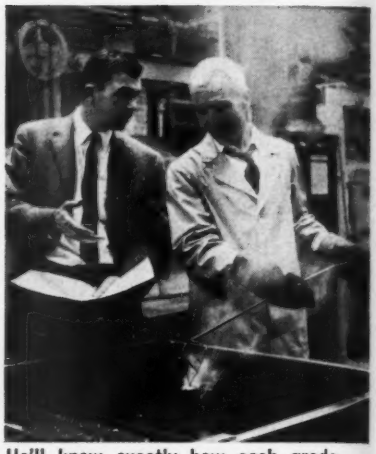

He'll know exactly how each grade responds to heat treating.

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All by standardizing on a few basic tool steel grades!

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Are You Caught...

BETWEEN RISING LABOR COSTS AND CUSTOMER RESISTANCE TO INCREASED PRICES?

A prominent machine tool builder* now saves $1,138.10 in man hours on each spline hobbing machine by using a HILL ACME Surface Grinder to produce flat, parallel ways as compared with their old method of planing and hand scraping: –

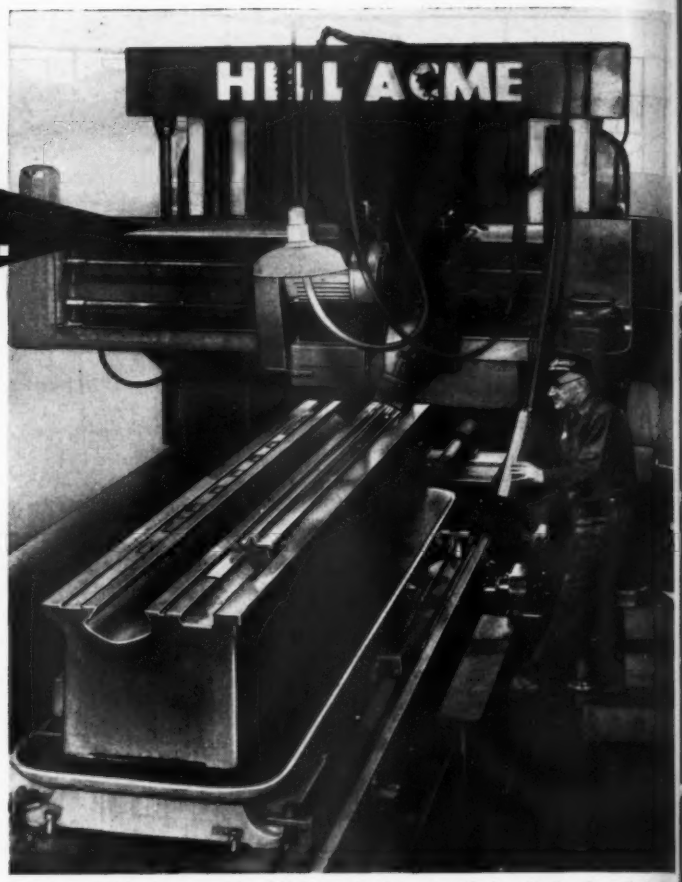
Here is the case history:

ITEM	METHOD	HOURS	RATE	TOTAL LABOR COST	
Bed 8'x72"	Scrape	96.0	2.35	$1,014.72	
	Grind	22.5	2.79	282.37	
				$ 732.35	Savings
Slide	Scrape	12.0	2.35	$ 126.84	
	Grind	.8	2.79	10.04	
				$ 116.80	Savings
Carriage	Scrape	25.0	2.35	$ 264.25	
	Grind	6.0	2.79	75.30	
				$ 188.95	Savings
Total man-hour Savings				$1,138.10	

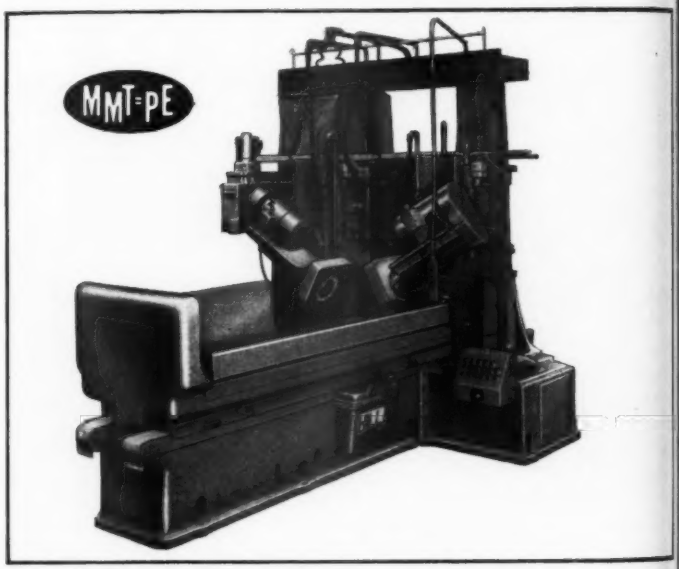
The manufacturer reports these additional advantages:

1. A consistency of way accuracy assured.
2. Permits the use of integral hardened ways.
3. Gives a uniform oil film between way surfaces.
4. Improves delivery schedules.
5. A very favorable customer acceptance.

HILL ACME Heavy Duty Hydraulic Surface Grinders are adaptable to a wide variety of stock sizes having flat surfaces. Table widths are 24" to 60". Table lengths vary from 7 to 30 feet. Built in both horizontal spindle and vertical spindle design.



Grinding "V" bed ways with a HILL Double Housing Hydraulic Surface Grinder.



*Builders Name on request

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CIRCLE INFORM-A-GRAM KEY NO. 8

Talk of the Month

Use Numerics—Even If It Means Retrofitting

by Harry E. Ankeney

Mr. Ankeney is manager of the Cincinnati Bickford Div'n of Giddings & Lewis Machine Tool Company. He discussed the "retrofit" aspect of numerical control at a special meeting of the American Management Association.

A WORD YOU WILL hear often with reference to numerical control is "retrofit," so it should be defined. It was coined in the aircraft industry from "retroactively fitted," as you would "fit" or equip a ship.

The "retroactively" indicates you go back and re-do a job that should have been done in the first place. Most airplanes are built this way. Keeping up with the changes is hopeless, so they build the plane then retrofit it by replacing parts that have been improved upon. In machine tools, we let a year or two elapse before we retrofit and usually the decision is based more on economic facts.

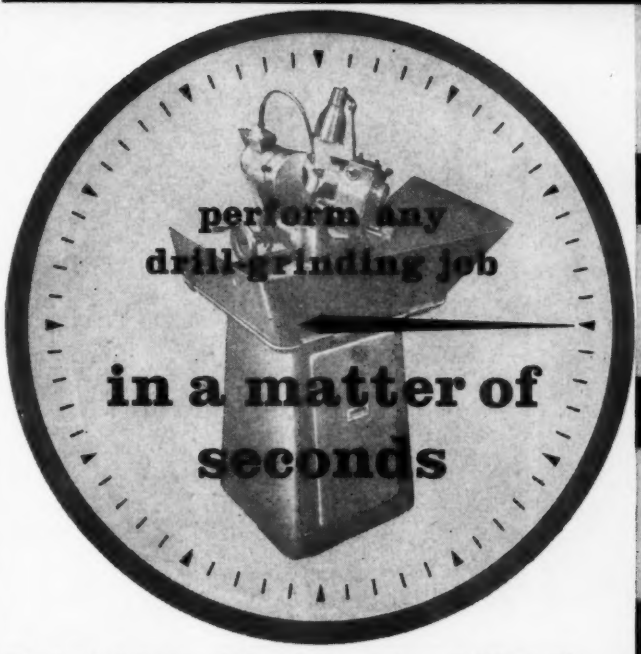
I have a motto which says, "Anything is possible if we are given enough time and money." Please keep this in mind as we talk about things that are possible, because in the times we are living, most things have to be justified on a dollars and cents basis.

In the beginning of numerical control, retrofit was the only way. Every prototype built for experimental work was on an existing machine. Some of the changes were slight, and some that started out to be slight got pretty extensive before they were finished. This is an

. . . Continued on page 12

develop your angles and repeat them!

ALINA SELECT-O-POINT drill grinders



Right hand twist drill, with centre
Twist drill for soft material, lips corrected
Three flute drill (core drill)
Spot facing cutter angle 180°
Screw tap, grinding of the angle of rake

Designed for rapid and accurate grinding of: Twist Drills • Sub Land Drills • Step Drills • Spot Facing Cutters • Keyway Milling Cutters • End Mills • Reamers • Screw Taps • Engraving Needles, etc.

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CIRCLE INFORM-A-GRAM KEY

Practical Tooling Tips

NUMBER 1 OF A SERIES

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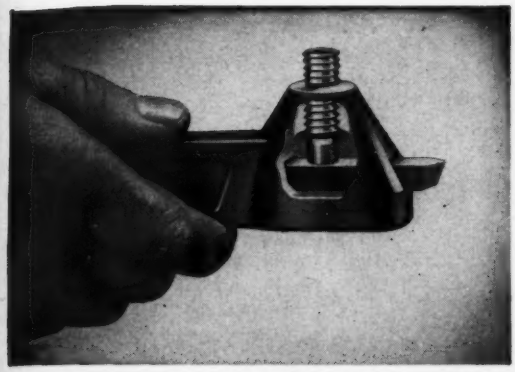
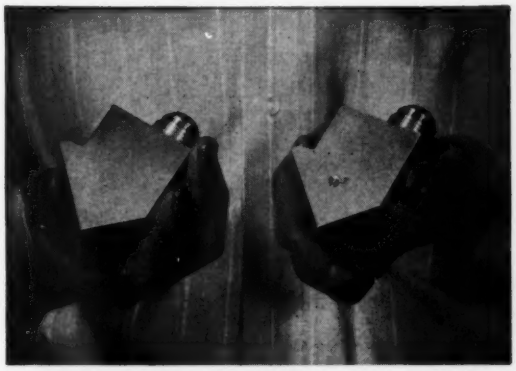


TO GET GREATER TOOL BIT RIGIDITY replace the tool holder screw with a Vlier Swivel-Pad® Clamp. The large, flat pad face provides many times more clamping area. Bits can be held tighter, reducing chatter and vibration. Small, narrow cut-off blades, multipoint tools, even stub ends can be rigidly held. Unique ball joint construction gives smooth angle adjustment in all directions.



EASY WAY TO STOP MARRING surface of part held in fixture. The part on the left was securely held in the fixture with a Vlier Swivel-Pad® Clamp. The scrapped part on the right was held with an ordinary set screw. With the Vlier Swivel-Pad® Clamp the pad stops at first contact with the part; screw torque is absorbed by a ball, preventing damage to the part. This exclusive ball joint construction also provides adjustment to off-angle surfaces.

SPRING PLUNGERS LET WRENCH DO MULTIPLE DUTY—The compression tool shown above is used to attach connectors to electrical wires. Formerly, each size wire connector required a different size tool. But now, through the use of Vlier Spring Plungers, one tool attaches all sizes of connectors—through the use of changeable jaws. The appropriate jaw for any size connector is easily inserted, accurately positioned, and held in place with a Vlier Spring Plunger.

THE RIGHT AMOUNT OF END PRESSURE AND NO MORE is what this spring plunger application calls for. More than 150 Vlier Spring Plungers are used to hold a plastic sheet in position during the forming operation of a plastic refrigerator door liner. Spring Plungers provide just the right amount of pressure to produce a perfect liner.

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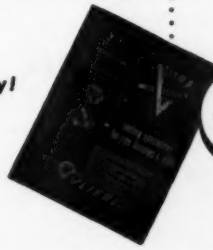

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CIRCLE INFORM-A-GRAM KEY NO. 11

. . . Month's Talk from page 9

indication of what is in store for you in retrofitting your present machines.

A lot depends on the performance you will be satisfied with. As a machine tool builder, we have had similar experience with tracer controls. Different tracer controls give performances of different speeds and accuracies. The way the controls are fitted to the machine also determines the speed and accuracy.

It always seems to us that a customer is satisfied with anything he does himself no matter how slow, inaccurate, or troublesome a system is. I guess that's just human nature. If we were not satisfied we would change ourselves, and rate of change varies directly with the degree of dissatisfaction. Human nature is also easily critical of the works of others, so to escape criticism a builder's machine must sell at the cost of the cheapest system, have the accuracy of the most refined system, and operate absolutely trouble-free.

Viewed Another Way

There is a different way of looking at costs here, too. If the builder-supplied system goes down, the user screams, "A $50,000 machine is out of production." But, if his own retrofit fails, it is only the $5,000 conversion kit that is lost.

Many times I have seen more than the cost of a new machine spent to fix up a klunker that was still a klunker after all was done. Yet the rebuilder either rationalizes this waste with, "If the repair crew had not been working on this they would have been working on something else," or he buries his head in the sand by lumping the repair costs so they cannot be found. I know there is a tax difference between capital asset money and repair money, but the cases I am talking about go way beyond this. What I am pleading for is a realistic look at the cost of retrofitting. Don't fool yourself into thinking that it doesn't cost anything.

Don't think I am getting off the subject by talking tracer controls — they have much in common with numerical controls as far as mechanical elements are concerned. Both perform best when the static and dynamic friction are nearly equal and very low. Both desire drives that are free from backlash — and that means windup and stretch as well as plain mechanical looseness.

Most systems require independent feed drives to the motions to be controlled. Until you turn your machine control over to disinterested electrons you never realize the compensations a human operator makes. Such things as uneven wear, excessive friction, poor dynamic characteristics induced by unfortunate combinations of mass, stiffness and stiction, plus gear train backlash can all be compensated for by the operator. When these must be eliminated or overcome to make retrofitting feasible, the burden sometimes becomes unbearable. Both the cost and potential savings of retrofit applications of numerical controls depend on factors which can best be evaluated only in terms of specific applications and equipment proposals.

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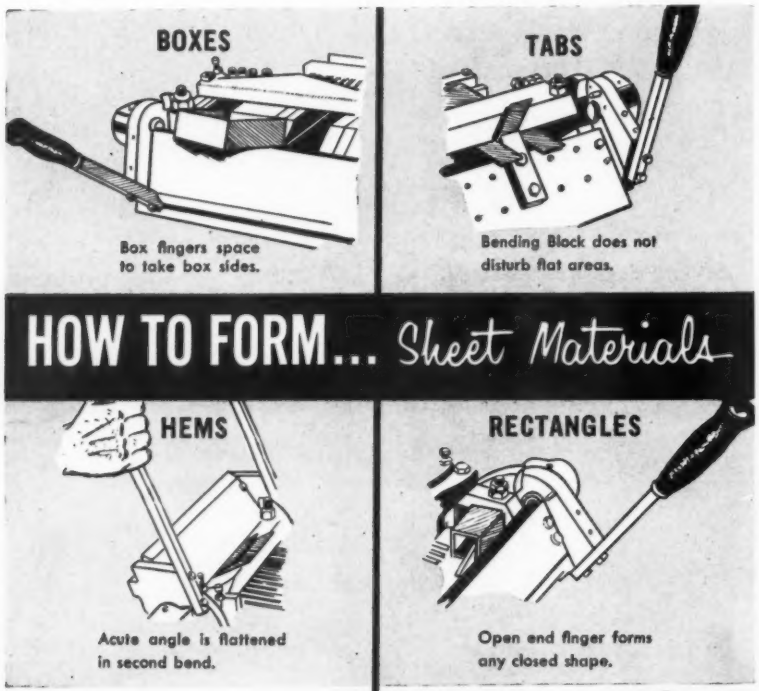
BOXES
Box fingers space to take box sides.
TABS
Bending Block does not disturb flat areas.
HOW TO FORM... Sheet Materials
HEMS
Acute angle is flattened in second bend.
RECTANGLES
Open end finger forms any closed shape.

with a

DI-ACRO BRAKE

The Di-Acro Brake is a six-in-one precision metal working machine simply tooled for a variety of jobs. Ten models in 6", 12", 18" and 24" widths handle up to 16 gauge mild sheet steel.

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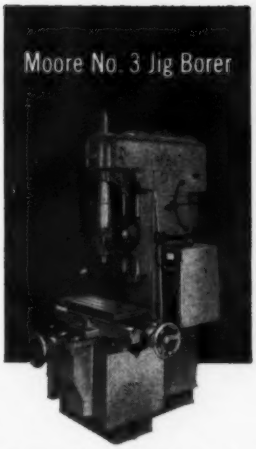
"The No. 3's split the tenths!"

So report users of Moore's New Jig Borer and Jig Grinder



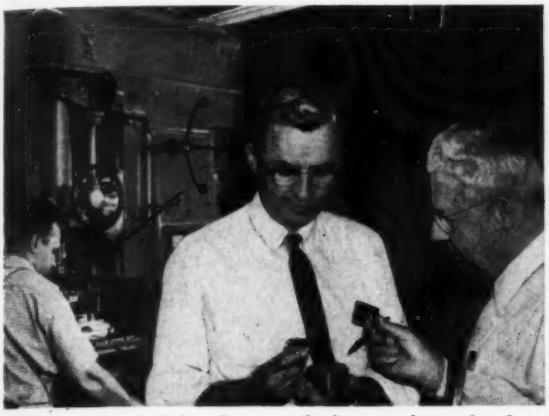
You will easily break the "tenth" barrier with this accurate machine. No gibs...no overhang...improved drive ...speed range of 60 to 2250 RPM...11 x 24" table working surface. It bores, drills, reams and spots holes in dies, jigs and production parts with unequalled speed and accuracy.

With this new, larger No. 3 model, you can grind—*with split-tenth* accuracy—holes plus regular and irregular contours to size and location after hardening. Faster strokes are provided for chop-grinding... infinite spindle speeds, 40 to 250 RPM...larger table working surface, 11 x 24".

All hardened, ground and lapped ways. Made and calibrated to the new international inch.

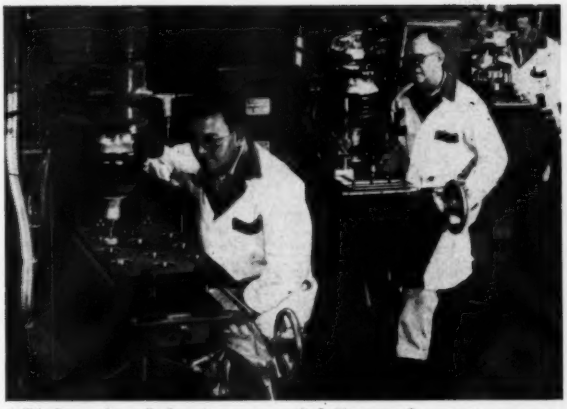
Write today for literature describing the many advantages of the No. 3 Moore Jig Borers and Jig Grinders.

MOORE SPECIAL TOOL COMPANY, INC.
300 Union Avenue, Bridgeport 7, Conn.



"Our operators feel that these are the best machines they have ever worked on. They take care of the tenth-splitting tolerances required by industry today. Over the years we have enlarged our Moore Jig Boring and Jig Grinding Department to 15 machines." These are the words of Herbert Harig, President (left above), and Karl Harig, Chairman (at right), Harig Manufacturing Corporation, Chicago, Illinois.

Among the highly skilled toolroom operators in the Federal Products Corporation, Providence, Rhode Island, is this talented jig grinder operator, Mrs. Florence Smith. Mrs. Smith achieves ultra-precise results with the No. 3 Moore Jig Grinder.



"We have found that it costs real dollars and cents to operate without Moore equipment. This cost factor is just one of many reasons why we recently added the new Moore Model No. 3 Jig Grinder. This Machine, with its tenth-splitting accuracy, hardened ways and wider range, enables us to service more customers better." Statement by Val Koller, President, Koller Die & Tool Co., Milwaukee, Wisconsin.

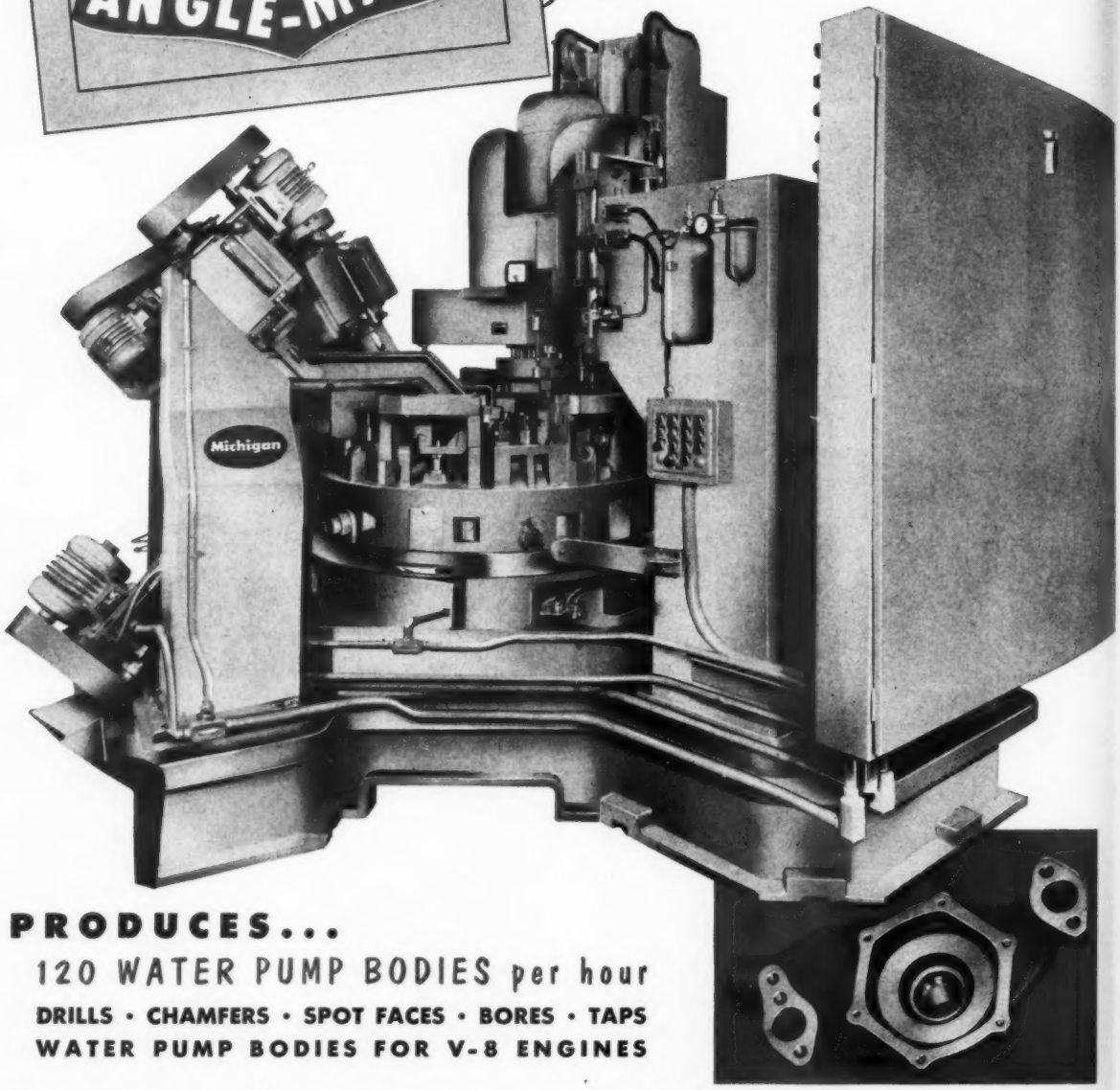
HOLES, CONTOURS AND SURFACES, Moore's authoritative book, tells how to produce tools, dies and precision parts the modern way. 424 pages, 495 illustrations. $5 in U.S.A., $6 elsewhere.

ADD MOORE TOOLS TO YOUR TOOLROOM

JIG BORERS • JIG GRINDERS • PANTOGRAPH WHEEL DRESSERS • PRECISION ROTARY TABLES • HOLE LOCATION ACCESSORIES

CIRCLE INFORM-A-GRAM KEY NO. 13

MICHIGAN ANGLE-MATIC



PRODUCES...

120 WATER PUMP BODIES per hour

DRILLS • CHAMFERS • SPOT FACES • BORES • TAPS

WATER PUMP BODIES FOR V-8 ENGINES

For Faster, More Economical Production

Michigan

We also invite your inquiries as to our line of tapping units, and index tables, both manual and automatic.

SPECIAL MACHINE CO.

11449 TIMKEN AVE., WARREN, MICHIGAN

Engineers and Manufacturers of High Production Metal Cutting Machines and Components.

CIRCLE INFORM-A-GRAM KEY NO. 14

THE TIMKEN ROLLER BEARING COMPANY

REPORTS SAVINGS...

7 to 1 REDUCTION IN... DIAMOND WHEEL COSTS

4 to 1 REDUCTION IN... GRINDING TIME

WITH ANOCUT ELECTROLYTIC GRINDING

THE TIMKEN ROLLER BEARING COMPANY

CANTON 6, OHIO, U.S.A.
TELEPHONE: GLENDALE 3-4311
CABLE ADDRESS "TIMROSCO"

June 3, 1960

Mr. C. R. Stroupe
Vice President
ANOCUT ENGINEERING COMPANY
631 W. Washington Boulevard
Chicago 6, Illinois

Dear Mr. Stroupe:

We are pleased to report that The Timken Roller Bearing Company now has a total of nine Anocut units in operation in the Canton, Columbus, and Bucyrus Divisions.

Seven of these are 300 and two are 600 ampere units. The seven 300 ampere units are used on 6" x 18" Norton Surface Grinders for chip breaker grinding operations. Three of these units are in a dual setup whereby a switch kit is used to switch the Anocut unit to a Porter-McLeod Cut-Off Machine. These cut-off machines are used to salvage chipped tools and cut carbide to special lengths.

The two 600 ampere units are used on Hammond SCE-10 dual table oscillating grinders. On these latter machines, we are, for example, removing .045" of solid carbide in 45 sec. from a tool approximately ½" square, processing two tools simultaneously.

We are realizing a savings of 7 to 1 in diamond tool costs, and a reduction in grinding time of approximately 4 to 1.

C. A. Laase
Mechanical Engineering Department

Orf-Hand Grinding Single Point Tools On Hammond 10" Duplex Electrolytic Grinder.

Electrolytic Chipbreaker Grinding On Norton Surface Grinder

Youre Invited...

TO VISIT THE ANOCUT DISPLAY CENTER AND PLANT DURING THE COMING MACHINE TOOL EXHIBITION IN CHICAGO, SEPTEMBER 6-16th.

ANOCUT T.M. Reg.
ENGINEERING COMPANY
631 WEST WASHINGTON BLVD. • CHICAGO 6, ILL.
PHONE STATE 2-5480

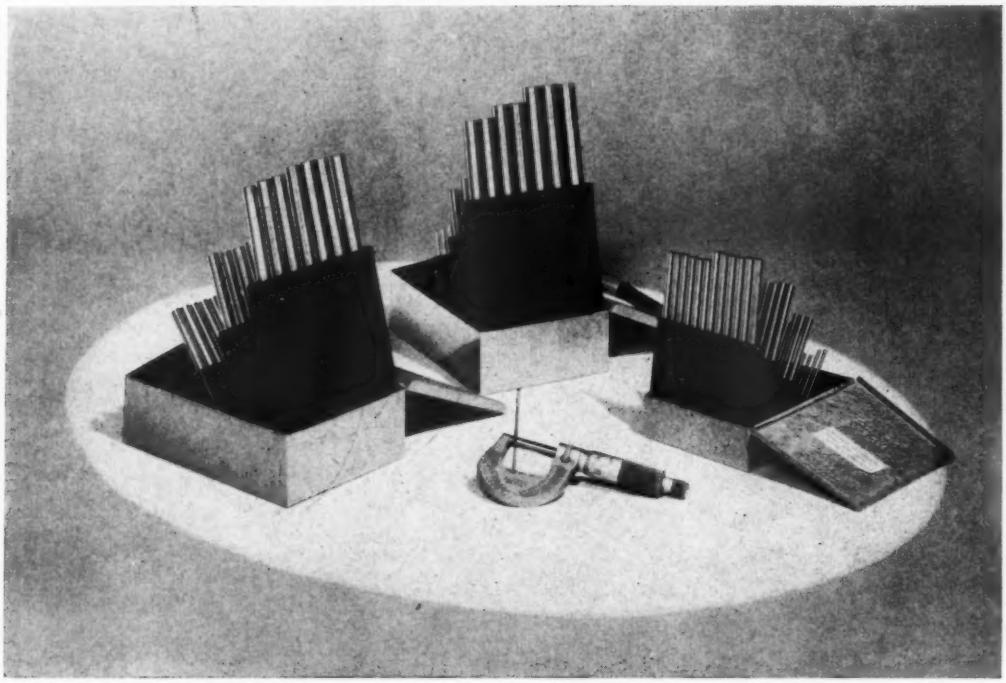
CIRCLE INFORM-A-GRAM KEY NO. 15

DRexel 6-4222 ESTABLISHED 1927

WILLIAM T. HUTCHINSON CO.

53 BROWN AVENUE SPRINGFIELD, NEW JERSEY

HUTCHINSON HSS BLANKS



115 Pieces – COMPLETE – .040" to .500" – $88.00

your choice of two tolerances
+ .0002" − .0000
or
+ .0000 − .0002"

JOBBER SET	LETTER SET	WIRE SET
$32.27	$29.03	$27.40
in Huot Index	in Huot Index	in Huot Index

M2 — HIGH SPEED STEEL — 64 "C" scale hard — gage tolerance — mirror finish — parallel ground.

ANY DECIMAL DIAMETER OF STANDARD LENGTH
.012" TO 1.000" SHIPPED ON 24 HOUR NOTICE

CIRCLE INFORM-A-GRAM KEY NO. 16

. . . Month's Talk from page 12

The retrofitting of numerical controls is taken to include:

1. Rehabilitation and modification of the machine tool as required.
2. Addition of special numerical gages or position feedback components.
3. Installation of servo drives if required.
4. Provision for the associated electronic control apparatus.

Getting Ready

The machine should be brought back to the highest possible level of precision, alignment, and rigidity. Then it will probably have to be modified to have anti-friction ways and screws. Though drives can be made big enough to overcome friction, and controls can compensate for Acme screws, this is usually a poor choice since the increased drive cost and slower response will be more expensive in the long run.

The position feedback unit can be a box driven by the precision power screw or a precision rack along the way to be measured, or it can be a glass scale mounted along the way in linear systems. In any case, this requires mounting and probably special guards to protect it from damage.

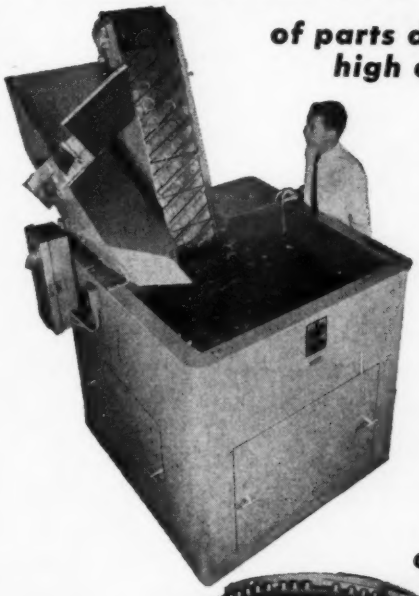
The servo drives may be hydraulic or electric, but usually a mechanical alteration is required to cut them free from a previous gear and clutch arrangement. Even if servo drives are not required, the means of starting and stopping will have to be an electric clutch or a similar device than can be electrically remote-controlled.

Unless the machine is a recent model, you will do well to investigate first whether it has been made obsolete by one with more spindle horsepower and higher feed rates. Ordinarily I would expect it is better to trade a 10-year old machine than to try to fix it up, unless it has sentimental value. Even with the latest models you can expect 15-20% less productivity out of a retrofitted machine as out of one originally equipped with numerical control.

Few companies have the engineering staff or time to do a good

. . . Continued on page 20

THE CARE AND FEEDING

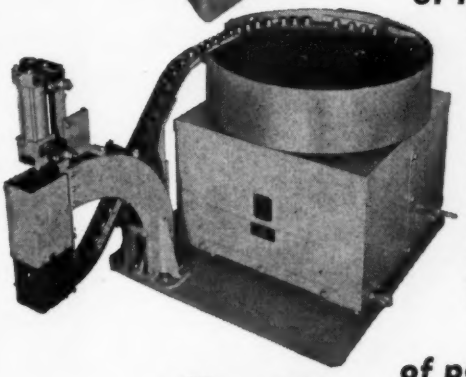


of parts discharged at high or low heights

DPS ELEVATING FEEDERS elevate, orient and feed parts of almost any size, shape and material to other machinery for processing and assembly. High capacity storage bins are designed to assure a steady flow of parts to elevating mechanism regardless of load level.

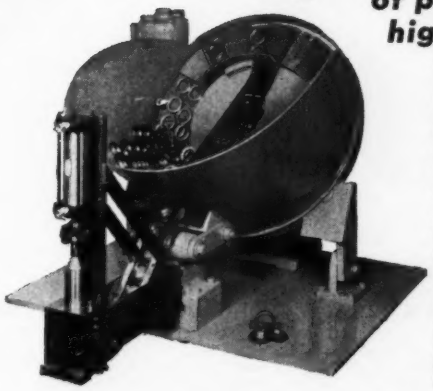
Orientation of parts is accomplished at discharge point of elevator — simplifying external track construction. Feeder can be arranged for right- or left-hand discharge. Return chutes are cushioned.

New Bulletin 2812 has full data on DPS elevating feeders. Write for your copy today.



of fragile or finished parts

DPS VIBRATORY FEEDERS are bowl type units that gently handle parts too light or fragile to be handled in rotary type feeders. Through a simple electromagnetic drive, a vibrating action is transmitted to the bowl causing the parts to move up a circular, inclined track. The oriented parts then enter feed tube or discharge track to machining or assembly areas.



of parts for high-production assembly

DPS ROTARY FEEDERS employ radially slotted or grooved rotating collector rings. Efficient orienting and feeding of parts is achieved through proper design and engineering of baffle plate, selector guard, feed track, and escapement mechanism. Three different designs are available to meet holding, orienting and feeding requirements. Safety clutch prevents damage to motor or gears in the event of parts jamming.

Detroit Power Screwdriver Company offers industry's most complete line of selective feeders . . . ranging in holding area from 80 cu. in. to 20 cu. ft. For complete details, call your DPS representative or write direct. *Ask for free catalogs!* 15,335

DETROIT POWER SCREWDRIVER COMPANY

2827 W. Fort St. • Detroit 16, Michigan

A Subsidiary of Link-Belt Company

CIRCLE INFORM-A-GRAM KEY NO. 17

FOR ACCURATE LOCATING USE UNIVERSAL LOCATING PINS

Universal Locating Pins assure quick, accurate locating throughout even the longest production runs. They're hardened and ground to extremely close tolerances . . . precision made to give long service life for much less than the cost of ordinary tool-room pins.

Press fit, threaded or lock-screw types, round or relieved, are stocked in all standard sizes for immediate delivery. Write for catalog detailing locating pins plus other Universal production tools.

Relieved Press-Fit Pin

Threaded Pin

Lock Screw Pin

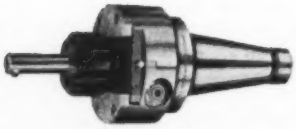
212

OTHER PRECISION-BUILT COST SAVING UNIVERSAL PRODUCTION TOOLS

Floating Chuck

Standard Collet Chuck

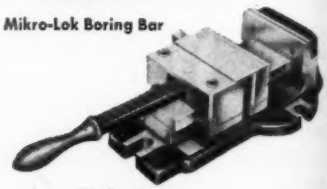
Mikro-Lok Boring Bar



Boring Chuck

"Kwik-Switch" Tool Holder

Standard Drill Bushing

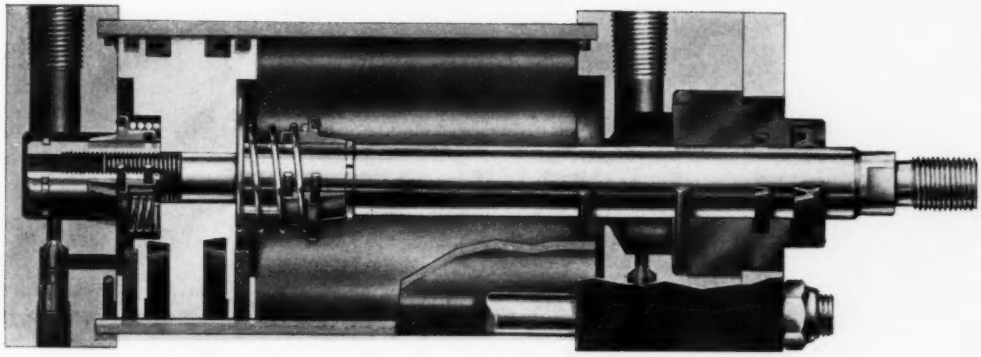


Wedge-Lock Production Vise

UNIVERSAL ENGINEERING COMPANY, FRANKENMUTH 8, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 18

Premiering...



dimensionally interchangeable
square-end air and hydraulic cylinders

by

Mead Specialties Co.

4114 N. Knox Ave., Chicago 41, Ill.

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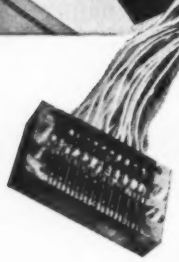

How Shepherd Industries Zooms the magnification to fit the job

Shepherd Industries, Inc., Nutley, N. J., makes micro-miniature magnetic heads for the memory drums and magnetic tape transports of computer systems. Here is an example of the assembly and inspection operations that keep their B&L StereoZoom® Microscopes busy eight hours a day.

Multiple layers of barely visible wire are wound uniformly around a micro-thin core. Coil-and-core assemblies must be inserted between spacers without scraping the magnet wire—working to tolerances in the area of .0004". A touch of the B&L zoom dial provides continuously variable magnification—from low power, for better views of deep recesses, to high-power blow-ups of critical areas—yet the long, unobstructed working distance remains constant.

"This work would be impossible without microscopes," says Merrill Jewett, Supervisor of Magnetic Head Production, "and a lot harder without these new B&L StereoZoom instruments."

Could be that B&L StereoZoom Microscopes can help you produce the impossible, or at least make what you're doing now a little easier, a little faster, a little more profitable. Now's a good time to find out.

BAUSCH & LOMB INCORPORATED
77308 Bausch St., Rochester 2, N. Y.

☐ Send me new B&L StereoZoom Catalog D-15.
☐ Schedule a demonstration at my convenience.

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Company .....
Address .....
City ..... Zone ..... State .....

BAUSCH & LOMB

CIRCLE INFORM-A-GRAM KEY NO. 20

. . . Month's Talk from page 17

redesign job because it requires a combination of a high order of engineering skills in electronics, machine tool design, and servomechanisms. However, if anyone has several machines of the same model, so they can amortize the cost, this might prove attractive. One of the disadvantages of retrofitting has been that the machine builders do not put out at a reasonable price a kit for retrofitting standard machines.

This is quite a paradox because many of the system designers based their hopes for riches on the retrofit market. The number of new machines made each year is pretty meager compared to the number already in the field. The number of new machines will definitely not support all the systems builders who are in the market today. Beware that you don't get one which will be obsolete tomorrow.

The Bright Side

Lest you think I am painting a lop-sided picture about retrofitting, I hasten to add several advantages in its favor. First, you can apply numerical controls to a type or make of tool that is not available with numerical controls as original equipment. You can also have the system of your choice if you are concerned about compatibility or having to know how to program too many different systems.

By retrofitting you may be able to get a numerically controlled machine into production faster.

Because of the availability of maintenance personnel, and the expensing of their work for tax purposes, it may be possible to get numerically controlled tools in this way when they would otherwise be impossible to attain. In some cases a faster write-off or shorter depreciation time allowed on retrofitted equipment proves attractive. Maybe management is that head-in-the-sand variety who will let you squander money on repairs but let go of capital assets money like it was their right arm.

Whatever it takes, get into numerical control and get in fast. Pick out the most likely application in your plant, pick out what ap-

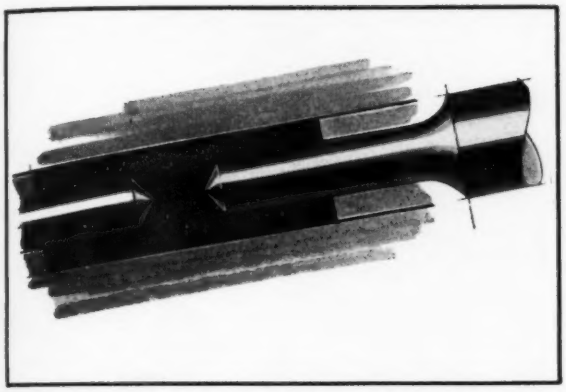
. . . Continued on page 24

Metallurgical Memo from General Electric

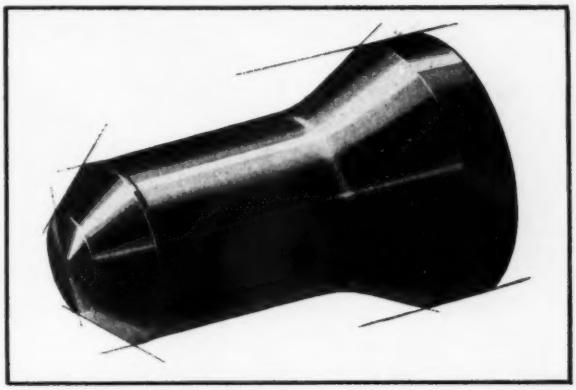
"MOVING METAL" WITH G-E CARBOLOY® CARBIDES

reduces metal waste, machining time, tooling cost, and improves metal grain structure

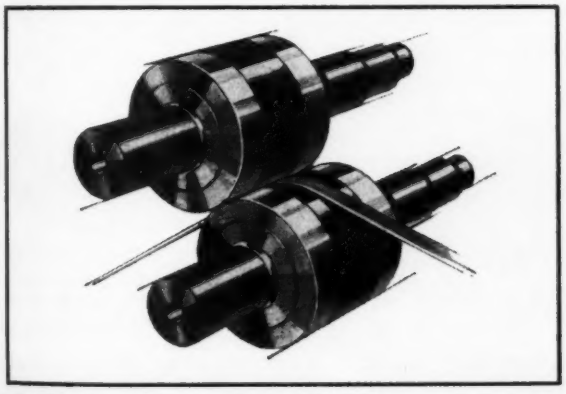
Continuing research by General Electric's experienced metallurgists and technicians gives you Carboloy cemented carbides of highest quality and uniformity—carbides designed to "move metal" at lower cost and with less metal waste. *Metallurgical Products Department of General Electric Company, 11111 E. 8 Mile Street, Detroit 32, Michigan.*



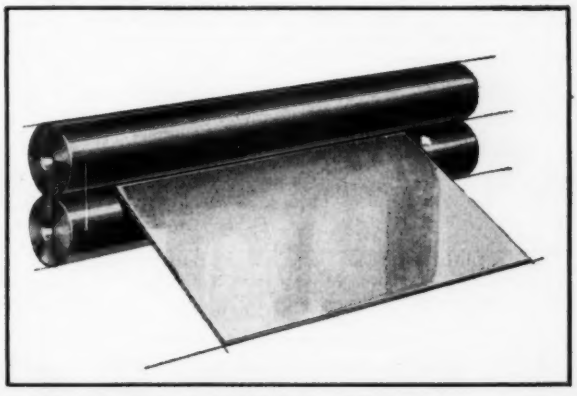
FROM SOLID SLUG TO WRIST PIN—2000 an hour! Increased production is but one of the advantages when you use extruding and coining punches of Carboloy cemented carbides. You get uniform weight, surface finish, improved strength.



COLD EXTRUSION PUNCHES made of G-E carbides find a wide variety of applications. For example, in the production of bearings, a solid carbide punch forms a race and cup from one steel slug—minimum waste; saves machining.



WHEN IT COMES TO WIRE FLATTENING, rolls of Carboloy cemented carbide outlast steel rolls many times. Smooth, wave-free roll surfaces produce rolled flat wire products of exceptional quality and finish; consistent uniformity.



YOU GET UNIFORM, MORE EVEN SHEET when you use rolls of Carboloy cemented carbides. Roll structure is uniform throughout; excellent for working stainless steel. Carboloy rolls last longer and do jobs not possible with steel rolls.

CARBOLOY. CEMENTED CARBIDES

METALLURGICAL PRODUCTS DEPARTMENT

GENERAL ELECTRIC

CARBOLOY® CEMENTED CARBIDES • MAN-MADE DIAMONDS • MAGNETIC MATERIALS • THERMISTORS • THYRITE® • VACUUM-MELTED ALLOYS

CIRCLE INFORM-A-GRAM KEY NO. 21

O-KNI-CO

MACHINE TOO

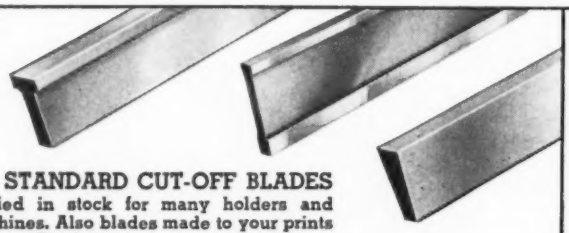
news

PRODUCTION FACTS THAT INCREASE YOUR PROFI

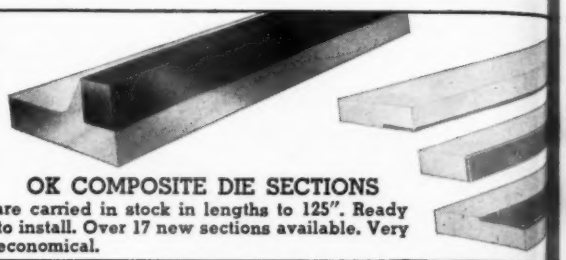
PUBLISHED BY THE OHIO KNIFE CO., CINCINNATI, OHI

MANY COMPANIES NOW CUTTING PRODUCTION COSTS — INCREASING MACHI LIFE AND ACCURACY WITH THESE OHIO KNIFE CO. HARDENED PRODUC

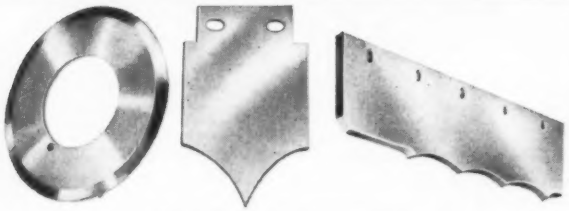
The products shown here are just a few of hundreds made by The Ohio Knife Co. of Cincinnati, Ohio. They are widely used as components by machine builders and as replacements when ordinary parts wear or break. The Knife Co. is internationally famous for their special hardening techniques, resulting in a reputation for producing products with long wear qualities. Many products are made by bonding high speed steel, tool steel or alloy steel to a mild backing. This gives the finest wear resistant face possible. Perfect bonding is assured through use of a 2 ton forging press and rolling mill. Other products are especi hardened to meet the requirements of the job. All products meticulously ground to extremely close tolerances. Specific bu tins are available FREE on all products.



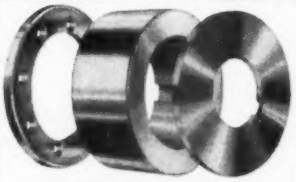
OK STANDARD CUT-OFF BLADES
carried in stock for many holders and machines. Also blades made to your prints or specifications.



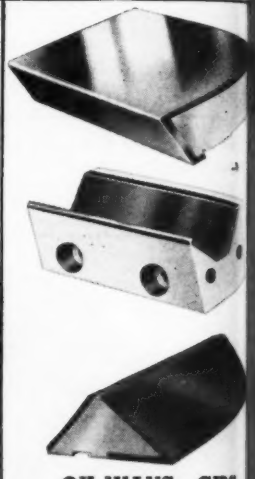
OK COMPOSITE DIE SECTIONS
are carried in stock in lengths to 125". Ready to install. Over 17 new sections available. Very economical.

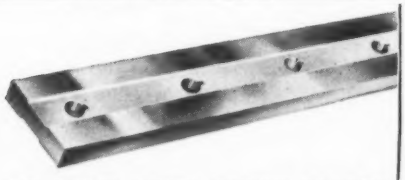


OK TUBE CUT-OFF BLADES
widely used in the manufacture of welded tubes.



OK ROTARY METAL SLITTING KNIVES AND SPACERS
in a complete range of sizes.

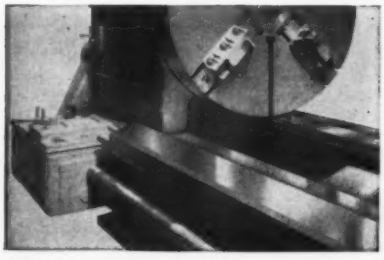




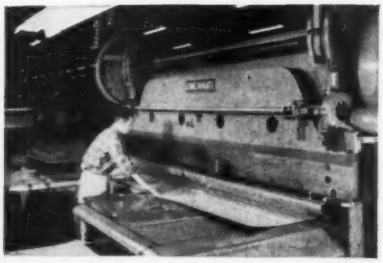
OK SOLID STEEL SHEAR BLADES
for all types shears and any type of shearing requirement.

OK CENTERLESS GRINDER BLADES
Complete range of sizes and designs carried in stock for quick delivery.

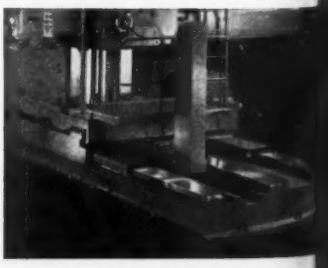
OK WAYS—GIBS
are practically wear-proof. A available in aluminum bro Complete selection



O-KNI-CO processed hardened ways on 60 inch lathe made by The Niles Tool Works.



65 ton Cincinnati Press Brake equipped with long-wearing O-KNI-CO processed shear blades.



O-KNI-CO hardened bedways, cross on a G. A. Gray Co. horizontal b machine.

FREE BULLETINS AVAILABLE • THE OHIO KNIFE CO., DEPT. 110-LL • CINCINNATI 23, O

CIRCLE INFORM-A-GRAM KEY NO. 22

Look for the Mark of

LEADERSHIP

Richard Brothers interchangeable punches, die buttons, and retainers are the standard of the sheet metal industry.

Modern plants, complete facilities, precision machinery, advanced heat treating, quality control and complete inspection have established RB's reputation for increasing production, lowering costs, and saving time.

That's why it's important that you look for the "RB" mark . . . the mark of leadership.

RICHARD BROTHERS / ***PUNCH DIVISION***

ALLIED PRODUCTS CORPORATION

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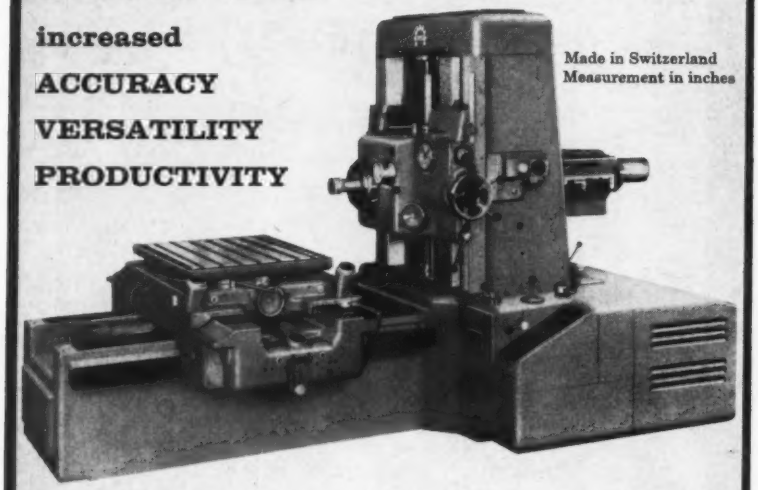
CIRCLE INFORM-A-GRAM KEY NO. 23

CUT
ACCUMULATED
ERRORS to a minimum

with the

DIXI 75 horizontal optical jig borer

increased
ACCURACY
VERSATILITY
PRODUCTIVITY



Made in Switzerland
Measurement in inches

- Automatic positioning can be changed instantly to manual operation
- Projected optical setting—direct reading to .00005" for linear motions and 1 sec. of arc for built-in rotary table. Linear optics provided with adjustable zero reference
- Simplified controls functionally arranged for greater operating speed and efficiency
- 3" diameter boring spindle
- Increased capacity: table size 39⅜" x 32"; 29⅝" cross travel; 23⅝" longitudinal travel; 25⅝" vertical travel
- Hydraulic feeds and infinitely variable spindle speeds
- Rear support optional

MBI has engineers available for consultation, guarantees service by factory trained staff, and stocks spare parts in New York.—Join the long list of leading aircraft and manufacturing plants throughout the United States which are using the horizontal optical jig borer.

Demonstrations upon request at our conveniently located demonstration centers.

MBI

M. B. I. EXPORT & IMPORT LTD.
A DIVISION OF MACHINERY BUILDERS, INC.
475 Grand Concourse, Bronx 51, N. Y.
Swiss Accuracy plus U. S. Know-how

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. . . Month's Talk from page 20

pears to be the best machine and system to handle it, and buy it. Start with a simple one, but get some first-hand experience.

Even if you spend a year studying you will only ask a small fraction of the pertinent questions you should ask. The problems are not so great that you can not work them out as you go. Many other people are in the same boat and anxious to share their experiences.

This reminds me of the early days of television. For those who were afraid of it, or wanted to put it off, there was always a new development or cost reduction just around the corner — they would wait for it. In the meantime, the rest of us went ahead and bought one and looked at the rasslers.

Let me sum it all up by saying, "Get into numerical control even if you have to retrofit a machine to do it."

Book Reviews . . .

WORK IMPROVEMENT, by Guy C. Close, Jr. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N.Y., 1960. 388 pages, $7.75.

Competition and the profit motive are heavily stressed by the author in this effort to help industry reduce costs and increase production. Suggestions are given on how to eliminate waste time, energy, and material. Work sampling and the principles of motion economy are discussed and aimed at the management chain from foreman to president.

1960 MANUFACTURERS' AGENTS' GUIDE. Published by Manufacturers' Agent Publishing Co., 505 Fifth Ave., New York 17, N. Y., 1960, 166 pages, paperbound, $15.00.

This guide, the first revision in two years, lists more than 11,500 manufacturers who distribute their products through agents. Classified by industry, it includes information on the manufacturer's principal products, estimated credit rating, and names and titles of sales executives.

PICK YOUR BITS for performance and service

CIRCLE C (T-5) (ground)
High Temperature Cutting

high cobalt-tungsten super high speed steel of well-balanced composition with superior *red hardness* and *wear resistance.*

VAN CHIP (M-3) (unground, ground)
General Purpose Cutting

high carbon, high vanadium moly-tungsten high speed steel with exceptional *wear resistance* and *red hardness.*

CIRCLE T-15 (T-15) (ground)
High Abrasive Cutting

tungsten base, high carbon, high vanadium cobalt high speed steel with superior *abrasive resistance* and *red hardness.*

SERVICE

YOUR FIRTH STERLING DISTRIBUTOR carries a complete range of standard sizes in clearly marked, durable packages. Call him today for quality products and dependable delivery.

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Offices and warehouses in principal cities

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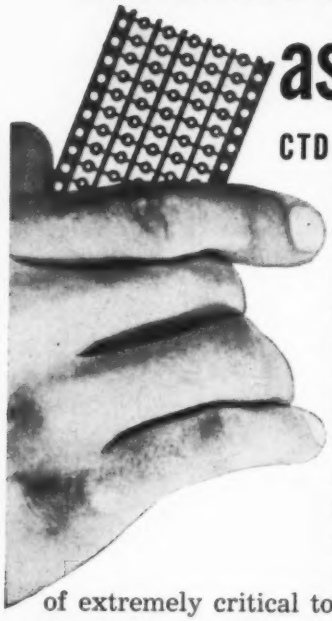
Cleveland Tool and Die
CASE FILE

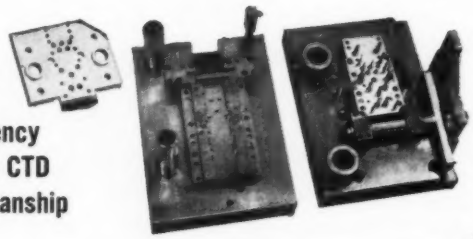
Reliability and quality assured to .001"



CTD PRECISION SECTIONAL DIES ASSURE QUALITY OF TEXAS INSTRUMENTS TRANSISTORS

Check the transistors in the next portable radio you hear, and chances are they'll read "TI" — trade mark of Texas Instruments Incorporated of Dallas, Texas. This aggressive company supplies leading manufacturers of computers, missiles and electronic equipment. For contour ground dies of extremely critical tolerances, TI chooses CTD sectional dies to stamp the tab sheets for the ultra-small semi-conductor wafer assembly within the transistor header. "Reliability and quality assurance demand component parts used with TI's transistors be uniform to .001"," says Texas Instruments.

Another example of the important production efficiency made possible by CTD precision craftsmanship



Cleveland Tool and Die *means precision...*

Dies, Jigs, Fixtures and Special Purpose Tooling

Send for brochure describing CTD's plant and facilities. FREE!

Cleveland Tool and Die Co.
30510 Lakeland • Willowick, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 26

MEN YOU SHOULD KNOW

The appointment of **Robert C. Dickey** as vice president and general manager of **Coated Abrasives, Inc.**, has been announced by **Charles B. Quarnstrom,** president.

Charles B. Eisenhauer has been named vice president of the **Electronics Div'n of Van Norman Industries, Inc.** He retains his title of general manager.

Robert H. Garretson has been named executive vice president, a newly created position, of **Consolidated Electrodynamics Corp.**, a subsidiary of **Bell & Howell Co.**

Newly appointed quality control manager of **Brush Instruments,** a division of **Clevite Corporation,** is **L. Briggs Dunn.**

Merrill A. Hayden, general manager of the **Machinery Hydraulics Div'n, Vickers Incorporated,** was elected a vice president of the company recently.

Sheldon K. Towson, Jr., vice president of **The Elwell-Parker Electric Co.,** has also been elected general manager of the company.

Donald L. Erickson is now production manager of **Brooks & Perkins, Inc.**

Eugene A. Nicol has been promoted to general superintendent of production at the **Maytag Company's Plant 2** in Newton, Ia.

Donald Henry has been named assistant general manager of **Rockwell Manufacturing Company's** Bellefontaine, Ohio, power tool plant.

Two promotions have been made recently by **Punch Products Corporation: Rocco L. Stefano** is now general manager, and **Ralph L. Weisbeck,** sales manager.

Andrew J. Waitkins has been promoted to chief engineer at **Fabri-Tech,** a subsidiary of **F. Jos. Lamb Co.,** makers of automatic parts handling equipment.

Frank D. Clark, a vice president of **The Van Keuren Co.,** has been appointed director of the firm's newly created **Thread Gage and Instrument Div'n.**

. . . Continued on page 29

No coil burnout with SPEED KING®

...pilot operated control valves

• Built to JIC standards • interchangeable pilots • choice of mounting types, optional features • ac or dc, any voltage • ¼ to 1 in. NPT

SPEED KING solenoid pilot coils, potted in molded resin, are unconditionally guaranteed against coil burnout for the life of the valve! And, Speed King pilots are totally enclosed, and sealed against entrance of dirt or moisture . . . valves are fully air-operated for speed and dependability . . . feature a hard-chrome plated stainless steel plunger floating in O-rings, to eliminate wear-producing metal-to-metal contact.

For multi-million cycle dependability, specify Valvair® SPEED KING control valves.

8111-3

Write for free Bulletin SK-100. Address: Bellows-Valvair, Akron 9, Ohio, Dept. TP-8E0.

Bellows-Valvair

The Bellows Co. • Valvair Corp. Akron 9, Ohio

DIVISIONS OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)

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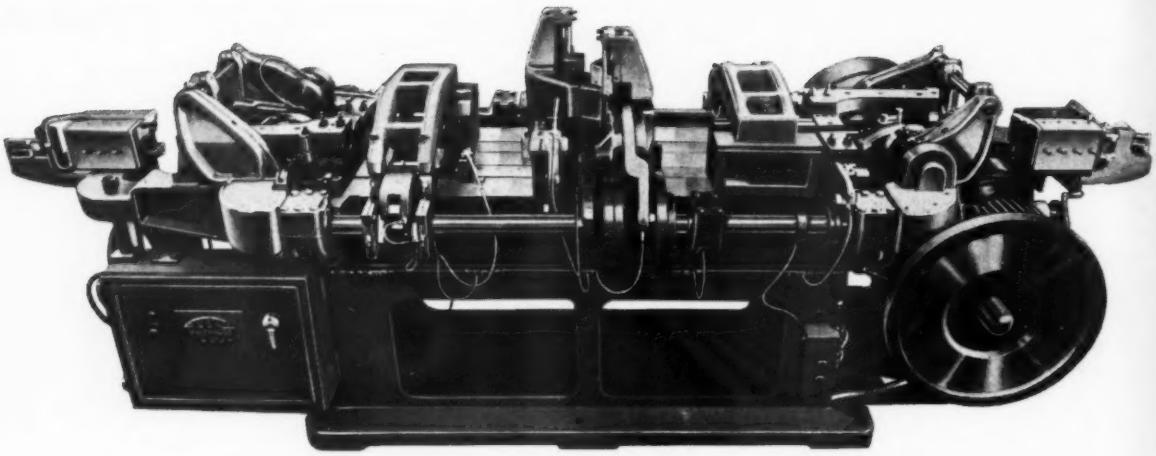


U.S. DUPLEX MULTI-SLIDE®

SIMULTANEOUSLY

FEEDS AT BOTH ENDS & PRODUCES TWO OR MORE STAMPINGS & FORMS & ASSEMBLES

The new U.S. Duplex Multi-Slide is a double ended machine which more than doubles previous production potentials.

With the U. S. Duplex you can ■ Produce and assemble 2 different stampings from the same or dissimilar materials. ■ Produce and assemble 2 complementary stampings. ■ Produce stampings from one end, wire form from the other end and assemble. ■ Produce 2 stampings and assemble with hopper-fed, prefabricated parts. ■ Make 3 piece assemblies, feeding material from both ends — and from the top. ■ Make 2 or more identical or different stampings not requiring assembly — and of the same or different material. ■ And, can be operated as a conventional Multi-Slide by feeding material into one end only. **Standard U.S. Duplex Multi-Slide equipment includes a feed, stock straightener, check and ram action at each end and a common 4-slide forming position with double, vertical strippers at the center. Material up to 3" wide can be fed into both ends of machine simultaneously. Feed length is adjustable up to a maximum of 6" and can differ from each end of the machine. Investigate the economies a U.S. Duplex Multi-Slide can give you. A few of these are: elimination of secondary operations; savings in floor space; ease of inspection of finished assemblies; and fewer rejects . . . all through the versatility of the "Duplex".**

Write today for full information and specifications. Send us your samples or drawings today and let us show you.

MMT·PE

US MULTI-SLIDE

See the U. S. Duplex Multi-Slide in Booth No. 842 at the 1960 Machine Tool Exposition.

U.S. TOOL COMPANY, INC.

AMPERE (East Orange) NEW JERSEY

U. S. Multi-Slides® • U. S. Multi-Millers® • U. S. Automatic Press Room Equipment • U. S. Die Sets and Accessories

CIRCLE INFORM-A-GRAM KEY NO. 28

... Men from page 26

New vice president in charge of production for Brad Foote Gear Works, Inc., is **George E. Gunderson.**

Frank K. Clark Jr. has been appointed chief engineer of the M. C. Jones Electronics Co., Inc., a subsidiary of Bendix Aviation Corp.

Harold Ellefson and **Russell Williams** have been named to new posts at the Maytag Co's plant in Hampton, Iowa. Ellefson is superintendent of production and Williams is supervisor of maintenance, toolroom, and plant protection.

New assistant general manager of the Plymouth-DeSoto-Valiant Division of Chrysler Corp. is **Frank J. Suslavich.**

Algie A. Hendrix is now manager of the AC Spark Plug Division operations in Milwaukee. Other changes there include the appointment of **Roy E. McCullogh** as director of advanced manufacturing development. He's succeeded by **Howard L. Roat,** new works manager of AC Spark Plug Division, Milwaukee.

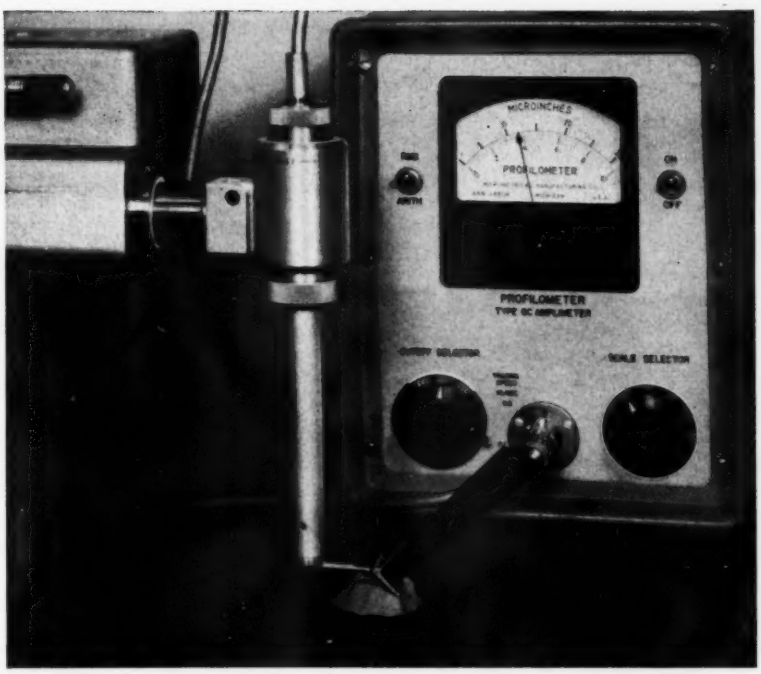
Richard Price has joined the Telecontrol Division of Hancock Industries, Inc., as a sales engineer.

Alva Allen Industries announced recently the appointment of **Matt P. Hirt** as their representative in Missouri, Oklahoma, Nebraska, Iowa, Kansas, Minnesota, and the eastern part of North and South Dakota.

Gisholt Machine Company has promoted **Werner I. Senger** from vice president in charge of balancing to vice president in charge of engineering. At the same company, **John C. Weston** has been appointed production manager, succeeding **Woodbridge Bissell,** who has retired.

Philip O. Geier, Jr., was recently elected vice president and appointed assistant general manager of **The Cincinnati Milling Machine Co.** He was formerly manager of the Products Div'n.

Calvin Irish has been appointed manager of product engineering of the **National Automatic Tool Company, Inc.** He replaces **LeGrande Terry,** who has retired.



PERTINENT QUESTION:

WHY do you need the Profilometer®?

FACTUAL ANSWER:

To check practically *all* surfaces against microinch roughness specs —and to help cut production costs in 7 different ways.

FREE BULLETIN LT14 gives details on the Profilometer and its practical applications. May we send you a copy?

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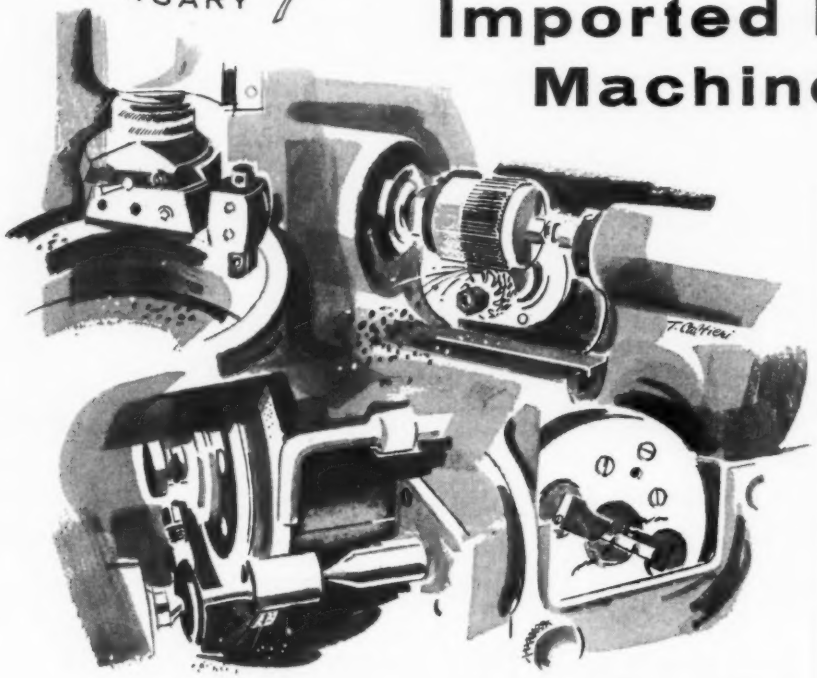
Manufacturer of the PROFILOMETER®, PROFICORDER®, MICROCORDER®, WAVOMETER®, ANDEROMETER®, VAROMETER®, CHART VIEWER • Exclusive American Sales Agent for CENSOR Dimensional Gaging and Sorting Equipment

CIRCLE INFORM-A-GRAM KEY NO. 29

20th ANNIVERSARY COSA

Your Largest Selection of Imported Precision Machine Tools



See them in operation—Booths 117 & 653

Coliseum Machinery Show—Sept. 7-15

Cosa will exhibit many of the latest designs in Precision Production Machine Tools. Featured in Booth 653, you will see a new **Deckel LK** with interchangeable heads for Jig Boring and Jig Grinding. There will be a new Coil-fed **Escomatic D-4** form-turning machine, automatically producing small precision parts—centered and drilled to reduce secondary operations. A **Schenck R06** Balancer, with autocycling, will precisely balance small parts revolving at 10,000 to 30,000 rpm. Two **Studer** Universal and Cylindrical Grinders, models RHU 450 and RM 250L, will grind parts to extremely close tolerances. Both Studers can be equipped with O.D. grinding and match grinding measuring devices for automatic sizing, spark-out control and machine shut-off. The RM 250L, a one-lever controlled grinder, is being shown for the first time in this country. A **Koepfer** Gear Hobber 170 for automatic production of various types of gears will also be demonstrated.

In Booth 117, two **Trumpf** Universal Sheet Metal Working Machines will demonstrate copy-nibbling, many curve cutting and forming operations.

Expert technicians will demonstrate these machines and provide information on the entire Cosa line, listed at the right.

CHECK COSA'S COMPLETE LIST FOR YOUR TOOLING NEEDS

Balancing Machines
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Boring Machines
- Boring, Milling
- Horizontal
- Jig
- Special
- Vertical

Chucking Machines
Drilling Machines, Radial
Dynamometers
Engraving Machines
- 2 & 3 Dimensional Pantograph

Fatigue Testing Machines
Flow Forming Machines
Gear Checking and Testing Machines
Gear Hobbers
Grinding Machines
- Cam & Contour
- Centerless
- Cylindrical, Plain
- Internal
- Jig
- Profile
- Surface
- Tap, Tool & Cutter
- Thread
- Universal

Jig Borers
Lathes
- Copy Turning
- Double End
- Facing
- Roll Turning
- Special
- Spinning
- Tracer
- Turret, Vertical

Milling Machines
- Contour
- Die Sinking
- Horizontal
- Planers
- Profile
- Skin
- Special
- Universal
- Vertical

Nibbling Machines
Planers, Open Side
Rack Cutters
Roller Shears
Screw Machines, Swiss, Coil-Fed
Transfer Presses

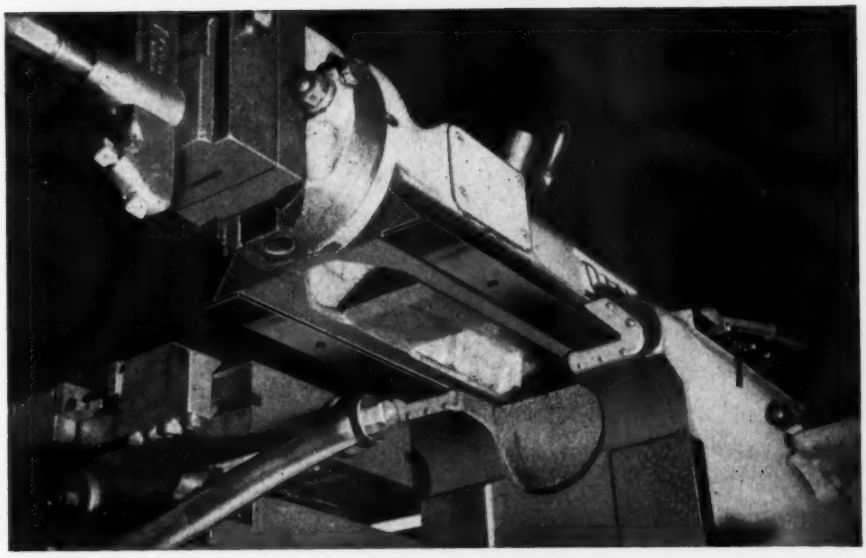
COSA

Importers of Leading Precision Machine Tools
Nationwide Sales and Service
COSA CORPORATION, 405 LEXINGTON AVENUE, NEW YORK 17, N.Y.

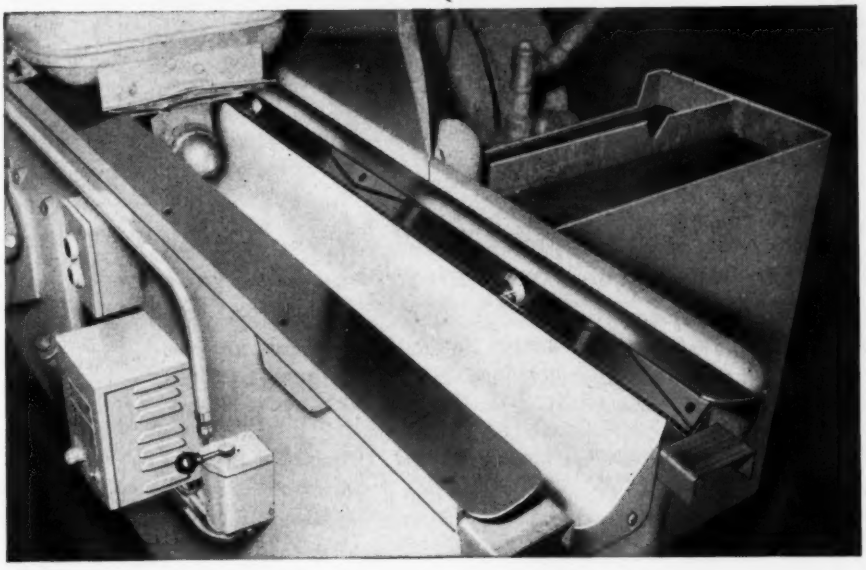
CIRCLE INFORM-A-GRAM KEY NO. 30

WEAR PLATES

ANOTHER *Lamina* BRONZE-PLATED PRODUCT



Lamina bronze–plated wear plates used on shaper ways.



Lamina bronze–plated wear plates used on grinder ways.

Lamina bronze-plated wear plates and their many uses are completely described in Bulletin WP-58. Send for your free copy.

Lamina
DIES AND TOOLS, INC.
P.O. BOX 31, ROYAL OAK, MICHIGAN
Phone: JOrdan 6-8711

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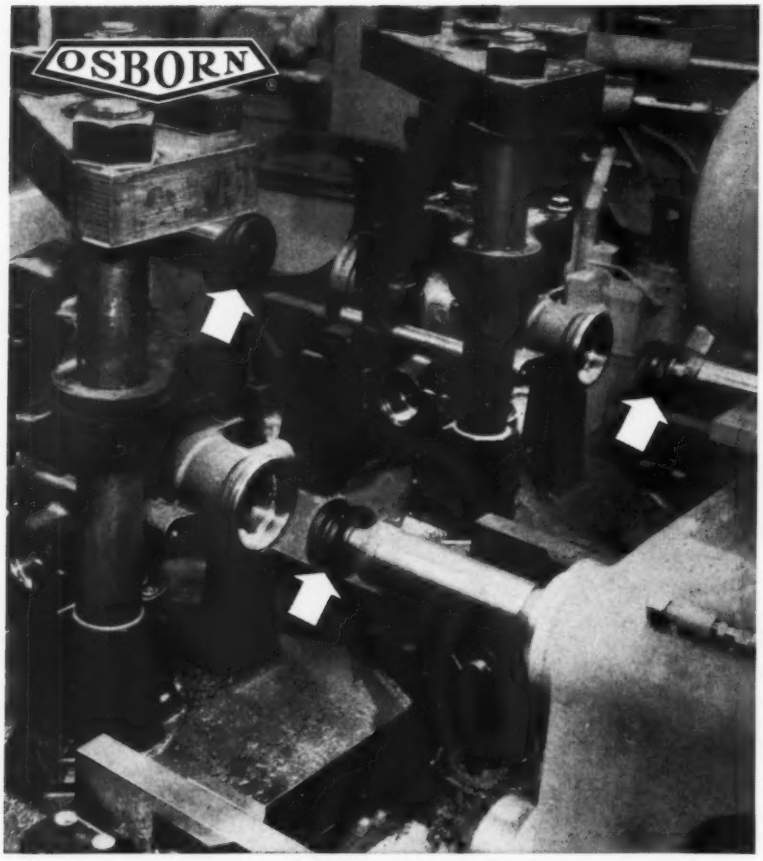

In this automatic twin setup, Osborn TY® brushes are advanced into both ends of a pair of valve housings without surface contact. The drive head oscillates the brushes around the ring groove contours, then retracts . . . all automatically.

HIDDEN BURRS knocked off

in 5½ seconds with new OSBORN TY® Power Brushes

This large manufacturer of automotive power steering equipment uses Osborn TY® brushes to deburr double internal ring grooves in both ends of these valve housings. Former off-hand methods required lots of time . . . effort. Still, high quality standards were hard to obtain.

Today deburring is done automatically with Osborn TY brushes . . . in just 5½ seconds. *High quality results are uniform . . . consistent.* These tough, durable TY brushes operate 16 hours a day in a 96-station automatic transfer machine. Even in this rugged service, brush life runs 2½ to 3½ weeks.

An **O**sborn **B**rushing **A**nalysis—made in your plant now at no cost or obligation—is the first step toward improving your metal finishing operations of every description—deburring, cleaning, polishing, precision blending. Write or phone for details. *The Osborn Manufacturing Company, Dept. L-5, Cleveland 14, Ohio.* Phone ENdicott 1-1900.

Osborn Brushes

Metal Finishing Machines . . . and Finishing Methods
Power, Paint and Maintenance Brushes • Foundry Production Machinery

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Howard V. Henderson, regional manager for **Ren Plastics, Inc.,** has been transferred to the firm's Detroit office, from which he'll concentrate on sales in the Detroit area.

Promotion of **Donald W. Lange** to sales engineer in the Chicago office was recently announced by **Parker-Hannifin Corporation.**

Roy J. Wagner has joined the **Telecontrol Div'n of Hancock Industries, Inc.,** as district manager for the Northeastern Seaboard.

David E. Glass has been appointed sales manager of the **Machine Tool Div'n** of **The Producto Machine Company.**

Newly appointed sales manager of **The Lapointe Machine Tool Company** is **Frank J. Kenney.** He was formerly assistant sales manager.

All sales activities of **The Cleveland Crane & Engineering Co.** are now consolidated into one sales department, headed by **Robert G. Birkin,** general sales manager, and **J. G. Frischkorn,** sales manager.

Francis J. Pauler is now industrial sales engineer for **Owatonna Tool Company.** He'll work closely with car, truck, tractor, and other equipment manufacturers.

The Abrasives Div'n of Elgin National Watch Company has announced the appointment of two field engineers to handle their diamond products. **Edward Dalka** will cover Western Pennsylvania and **Charles Swanson,** Northern New England.

Six men have been added to the fastener products sales staff of **Standard Pressed Steel Co. Richard Gormely** and **Paul Campion** in New England, **Richard Kress** and **Steven Mahoney** in the Midwest, and **William Gennoy** and **Ralph Pucci** in Los Angeles.

ANNOUNCING

NEW GISHOLT 3F FASTERMATIC WITH *FeeDial* CONTROL

IN JUST 15 MINUTES!

...then set your tools and take your trial cuts. That's how fast and simple it is to set up the new Gisholt MASTERLINE 3F FASTERMATIC Automatic Chucking Turret Lathe!

Only 15 minutes to pre-select feeds, speeds and functions—Now the desired feed rate is individually selected for each tooling station by turning a dial control. Selection of spindle speeds and machine functions is equally fast—just flick toggle switches. You do it all in just 15 minutes.

Completely automatic—But your savings don't end with fast setup. The automatic cycle assures consistent quality at fixed production rates. Any operator, even a new man, can chuck the work, start the cycle and remove the finished part. He has ample time to handle another machine.

What's more fast setup makes the new 3F pay off big on machining small lots—25 to 50 pieces—as well as long production runs. Contact your Gisholt Representative, or write us.

Send for literature—Ask your Gisholt Representative to show you how this new 3F with *FeeDial* can cut costs on your work.

GISHOLT MACHINE COMPANY
Madison 10, Wisconsin

MMT=PE

Turret Lathes • Automatic Lathes
• Balancers • Superfinishers • Threading Lathes
• *Factory-Rebuilt Machines with New-Machine Guarantee*

Investigate Gisholt's Extended Payment and Leasing Plans

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- ☐ **ADHESIVE BONDING OF METALS** by George Epstein. 1954; 227 pages. Types and strengths of adhesives, joint factors, etc. **$2.95**
- ☐ **BRAZING MANUAL** prepared by the Committee on Brazing and Soldering, American Welding Society. 1955; 208 pages. Practical information on every type of brazing problem, including tables. **$4.75**
- ☐ **COLD FORMING OF STAINLESS STEELS** by Lester F. Spencer. A 28-page pamphlet on the subject. **$1.00**
- ☐ **DIAMOND TECHNOLOGY** by Paul Grodzinski. 784 pages. 93 working tables, and over 486 photographs and drawings. The only standard work on the subject. **$10.00**
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- ☐ **HANDBOOK OF BARREL FINISHING** by Ralph F. Enyedy. 1955; 288 pages. Every phase of barrel finishing, including over 150 complete specification sheets and latest development. **$8.25**
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- ☐ **INSTRUMENTS FOR MEASUREMENT & CONTROL** by Werner G. Holzbock. 1955; 416 pages. Fully describes, illustrates and compares all current devices for measuring and controlling temperature, moisture, pressure, flow, uniformity, etc. **$10.00**
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- ☐ **PRINCIPLES & METHODS OF SHEET METAL FABRICATING** by George Sachs. 1951; 537 pages. Describes in detail sheet metal forming methods, metallurgical effects in stamping, drawing, extruding, bending; design of parts and dies, etc. **$11.00**
- ☐ **PRODUCTION CONTROL** by Nyles V. Reinfeld. 1959; 340 pages. A practical guide to the principles and functions of production control—details forecasting, scheduling and inventory techniques—incorporates up-to-date research from 500 companies. **$8.00**
- ☐ **PROTECTIVE COATINGS FOR METALS** by Burns and Bradley. 2nd edition. 1955; 657 pages. Latest information on the composition, properties and performance of metallic and organic coatings. **$12.50**
- ☐ **TECHNICAL WRITING MANUAL** by Christian K. Arnold. A glossary of word usage for technical people. **$2.50**
- ☐ **TECHNIQUES OF PRESS-WORKING METAL** by Eary & Reed. 472 pages. 20 chapters and hundreds of drawings cover this subject in highly comprehensive detail. **$12.00**
- ☐ **TREATISE ON MILLING & MILLING MACHINES** by The Cincinnati Milling Machine Co. 896 pages, over 200 formulas and 700 illustrations and charts. **$8.00**

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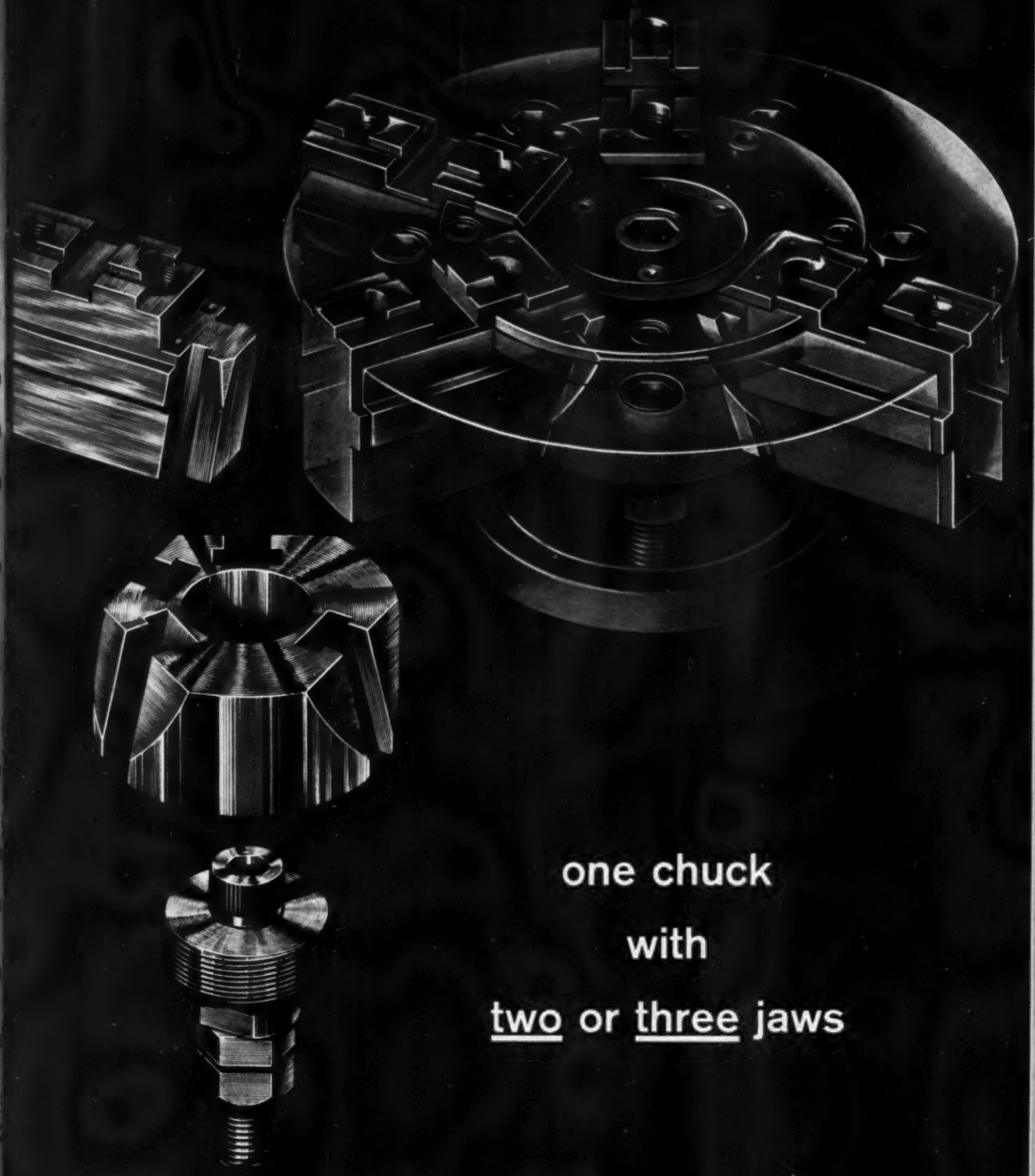
BY _____ TITLE _____

CIRCLE INFORM-A-GRAM KEY NO. 35



one chuck
with
two or three jaws

SKINNER DUAL PURPOSE POWER CHUCK

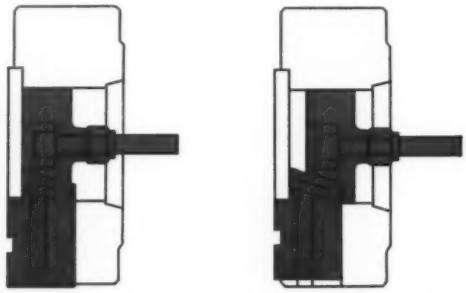
One Dual Purpose Power Chuck saves the cost of an additional chuck

Skinner dual purpose standard power chuck is designed with four master jaws so that it may be used as a two or three jaw chuck. It is no longer necessary to pay for one chuck to machine round work, and an additional chuck to machine odd shapes and castings. Not only do you save the cost of an additional chuck but you get all of the advantages of Skinner power chuck design listed below. Skinner dual purpose power chucks are available with adjustable, non-adjustable, or serrated jaws, in sizes 8″ to 36″.

A—Transparent view of dual purpose power chuck B—Mast
C—Wedge D—Drawbar Stud and Wedge plug

Skinner wedge-type chuck offers these advantages

- Allows automation of long production runs.
- Reduces operator fatigue—air performs the muscle work.
- Adjustable gripping pressure—air pressure can be adjusted for light or heavy chucking—is not left to the judgment of the machine operator.
- Work can be gripped internally or externally.
- Assured continued high accuracy because of wedge design (see illustration).
- Reduced wear because of hardened parts—models available with flame hardened center hole and jaw locks.
- Complete line—heavy and light duty models in sizes from 4″ through 36″.

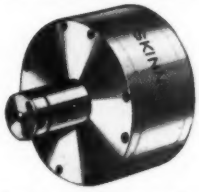


Wedge at top of stroke—jaws fully open (External gripping)

Wedge at bottom of stroke—jaws fully closed (External gripping)

The wedge and three jaws—only four moving parts—operate as a collet does with accuracy maintained over the whole range. The wedge angle is 14° which was found to be the most efficient angle for maximum power and jaw travel. With this wedge construction, the grip of a Skinner power chuck holds as set—even if the air line is broken—until opening power is applied in the opposite direction.

Skinner Power Chuck Accessories



Double-Acting Rotating Air Cylinders for use with power chucks and fixtures provide maximum pressure with a minimum amount of air. Cylinder walls are burnished to provide maximum sealing life. Cylinders in sizes 6 to 18 with semi-steel bodies are designed for low speed operation. Aluminum body cylinders in sizes 4 to 20 are designed for high speed operation.

Packaged Power Chucking Assemblies are available for Atlas, Cintilathe, Hardinge, Logan, Regal, Sheldon, South Bend, and many similar lathes. Assemblies are also available for Brown & Sharpe and similar automatic and hand screw machines to permit chucking of cold drawn parts, small or odd shapes and castings. Packaged assemblies consist of chuck with two or three jaws, threaded drawbar or drawtube, rotating air cylinder, cylinder adapter and necessary mounting for the individual machine.

Power Chuck Fixture, air or hydraulically operated, holds work for drilling and milling machines and for other bench and machine installations. Available in many jaw types in sizes 5″ to 36″.

A Complete Line of power chucking accessories includes hand, foot, and solenoid valves, drawbars, air units, and soft blank top jaws.

* * * *

For complete information about the Dual Purpose and other power chucks and power chuck equipment, contact your Skinner Representative, Distributor, or write us at the address below.

SKINNER CHUCKS®

SKINNERCHUCKS

THE CREST OF QUALITY

THE SKINNER CHUCK COMPANY • NEW BRITAIN, CONNECTICUT, U.S.A.

PRINTED IN U.S.A.

Book Reviews . . .

WELDING HANDBOOK, SECTION III, edited by Arthur L. Phillips. Published by American Welding Society, 33 W. 39th St., New York 18, N. Y., (fourth edition), 1960. 512 pages, $9.00.

Recent advances in metal joining and cutting are treated in this supplement to earlier editions. Included are sections on adhesive bonding and welding of plastics, ultrasonic welding, welding by cold-working, stud welding, metallizing, brazing, and arc cutting processes.

★ ★ ★

THE NEW PRODUCT, by Delmar W. Karger. Published by The Industrial Press, 93 Worth St., New York 13, N. Y., 1960. 234 pages, $5.00.

This book's subtitle—"How to find, test, develop, cost, price, protect, advertise, and sell new products"—gives a good insight into its contents. It also includes an extensive bibliography for those wishing more information on topics covered. Mr. Karger was formerly manager of new product development for Magnavox Co. He is now Professor and head of the department of management engineering, Rensselaer Polytechnic Institute.

★ ★ ★

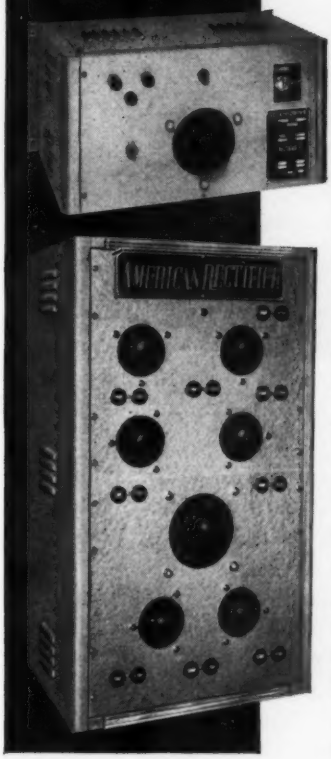
MACHINE SHOP ESTIMATING, by W. A. Nordhoff. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y., (second edition), 1960. 532 pages, $9.00.

Production planners can get a better idea of how long a given machining operation should take from this up-dated manual. It dwells particularly on the relation between production and the available horsepower of equipment. Tables have been broadened to include power constants and horsepower factors, estimating data for the turret drillpress, the Cri-Dan threading machine, and electrical discharge drilling.

Q: A:

VARIABLE SPEED PROBLEMS???

SELENIDRIVE* speed controls are your answer!



The AMERICAN RECTIFIER line of standard variable speed drives provides a highly efficient single knob control from any A.C. source for *all* D.C. motors up to 50 HP. Incorporating a heavy duty semiconductor rectifier with variable voltage drive, these rugged, reliable units assure smooth starting with infinite *stepless* adjustment from zero speed to above rated RPM with *constant* torque. SELENIDRIVES are designed for continuous duty, have no moving parts or electronic components and are virtually maintenance-free. The basic power package is available with optional automatic preset speed starting, remote control, reversing and dynamic braking. Thousands are in use throughout the world in such wide-speed range applications as printing presses, winding machines, lathes, bottling machines, conveyors, centrifuges and general production line control.

This typical custom-engineered SELENIDRIVE (ill. left), was recently designed as a multiple motor speed control. Six D.C. motors can be operated independently or together for full range control, coupled with a single master speed adjustment, individual and over-all emergency braking stations, all completely combined in a single space-saving console.

At no obligation, our Engineering Department will submit a quotation on any SELENIDRIVE for your speed control problems.

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All SELENIDRIVES carry the full AMERICAN RECTIFIER guarantee as to performance and construction. Complete informdtion on their versatile features and time-saving applications may be obtained by writing for free booklet no. T-8

Other quality industrial products of American Rectifier Corporation include power supplies to 500KW, electric brakes, automatic voltage regulators, etc.

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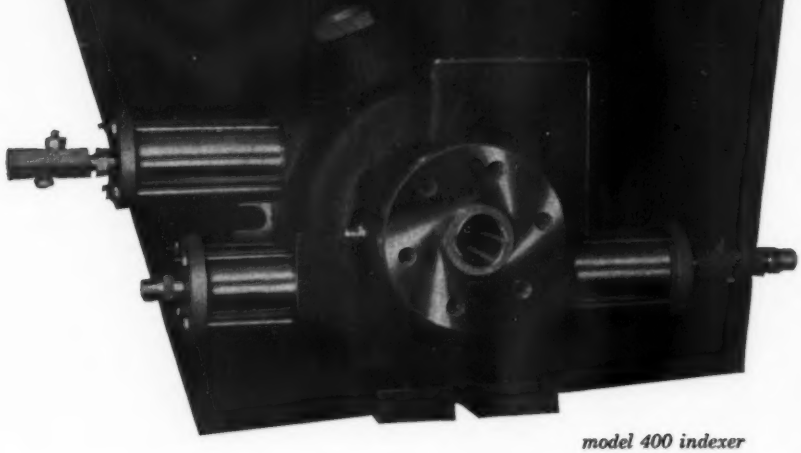
CIRCLE INFORM-A-GRAM KEY NO. 37

For speeding precision production

AUTOMATE

with

Erickson Indexers

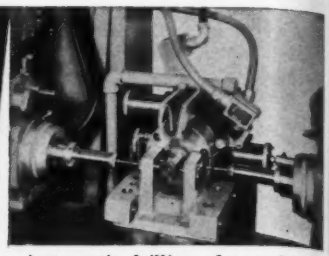


model 400 indexer

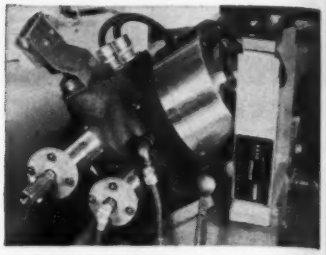
Perhaps these actual applications of automation will trigger your imagination . . . show you how Erickson Indexers can help you smash bottlenecks in your own production operation.

You can interlock them into production setups with microswitches and solenoid valves. And with Erickson Indexers you automatically get consistent positive positioning within 2 minutes of a degree . . . repetitive accuracy in low "tenths" of a thousandth.

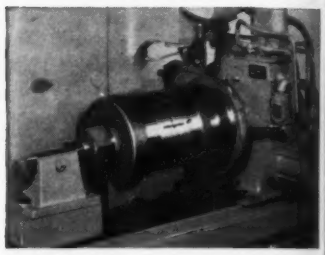
Speed to keep lines humming . . . accuracy to banish rejects . . . long life to slash maintenance and capital investment—all add up to Erickson Indexers. A-1562A



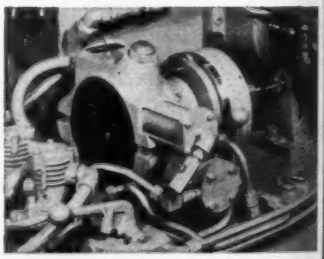
Automatic drilling of cross holes being done on Erickson Model 400 Speed Indexer with air cylinder and Expanding Drawbar Mandrel. Indexer equipped with interlock limit switches.



Angular drilling in jet part held in air operated collet chuck on Erickson indexer operating automatically. Entire fixture designed and built by Erickson.



Using end-clamping for half bearing, machine mills 8 oil grooves then skip indexes back to starting position for next part.



Milling four and six flats on needle valve part. Owing to size, part is placed in tail stock head-first, and tail stock then positions it in chuck and retracts.

ERICKSON TOOL COMPANY

34551-8 SOLON ROAD • SOLON, OHIO

COLLET CHUCKS • EXPANDING MANDRELS • AIR-OPERATED CHUCKS • FLOATING HOLDERS • TAP CHUCKS
• AUTOMATIC INDEXING • MASTER SPACERS • DIAPHRAGM CHUCKS • PUSH-ON ARBORS • QUICK-CHANGE HOLDERS
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• EXPANDING JAW MANDRELS • SPECIAL HOLDING FIXTURES (including gear-holding)
• BORING BARS • SPADE DRILLS • RECESSING TOOLS

CIRCLE INFORM-A-GRAM KEY NO. 38

WHAT CAN NUMERICAL CONTROL DO FOR ME?

BY THE THOUSANDS OF YOU who will attend next month's Machine Tool Exposition—1960, the most frequently posed question will be: What can numerical control do for me?

Whether your question be based on problems pertaining to hole locating and boring, profiling or step turning, a high frequency of simple repetitive operations, or a program of intricate operations on a single workpiece, the answer to your question will be found right on the Exposition floor.

There will be so many varied working exhibits of numerical control that we may even predict that the actual answer to your question "What can numerical control do for me?" can be put on a tape, the tape then run through the reader of a machine destined for doing the kind of job you have in mind, and right then and there you will have a working demonstration of "What can numerical control do for me?"

The prominence that the numerical control of machine tool functions has gained in five short years is best illustrated by the role played by numerical control in the Machine Tool Expositions.

In the 1955 Exposition there were something like four numerically controlled machines on display.

Next month, in Chicago, you will be confronted by at least 40 manufacturers presenting over 100 numerically controlled machines!

These exhibits will present, as of September, 1960, the most advanced state of the art of numerical control. What you are going to see, compared to the 1955 offerings, is going to be somewhat overwhelming.

You will find, too, that whatever length of time you allocate for the exhibits, it will prove to be far from enough in which to get the full impact of numerical control upon your manufacturing enterprise.

The important thing to bear in mind relative to the production efficiencies and cost reducing capabilities of numerical control is this: Whatever numerical control can do for you, it can (and will) do just as well for your competition.

Numerical control—1960, can well prove to be the shot in the arm necessary to get the machine tool industry out of its current doldrums.

This, of course, can be said of the Machine Tool Exposition—1960 as a whole, with its promotion formula, MMT=PE (Modern Machine Tools = Production Efficiency). This equation will, as the mathematicians would say, be satisfied by every exhibit at the Exposition.

Today's standard machines represent such advances over those of 1955 as to bring many a replacement and modernization budget to fruition. Here again, you are up against not only your competitor's current production techniques but his planning for the future.

You will see standard, but highly automatic machine tools which have the built-in capabilities of jobbing machine shops. And you will see high production, single purpose machines making more chips per minute than could have been anticipated five years ago.

We will predict, however, for the Machine Tool Exposition—1960, that numerical control will steal the show, and that you will witness most impressive demonstrations and will receive many stimulating and inspiring answers to your frequently put question: "What can numerical control do for me?"

E. Willard Pennington

Editor

coming attractions . . . NMTBA show: MMT-PE

A REVEALING, "See-for-Yourself" DEMONSTRATION OF WHAT BRAND NEW KRW PRESSES CAN DO

Above is a preview of K. R. Wilson's exhibit at the coming Machine Tool Exposition. Yes, there'll be 3 brand new KRW Presses on display... and each will be in action. Here, you'll see how both standard and special press requirements can be fulfilled by KRW most profitably for you. Come... visit KRW at the show... and bring your questions along. Factory engineers will be on hand to assist you in whatever way they can. K. R. Wilson, Inc., Arcade, N. Y.

DO IT NOW! PUT BOOTH 1444 ON YOUR "MUST SEE" LIST

KRW hydraulic presses

See (A) this modernized 200-ton Downstroke General Purpose Press... the latest version of KRW's popular 3700 Series (75-300 ton capacities).

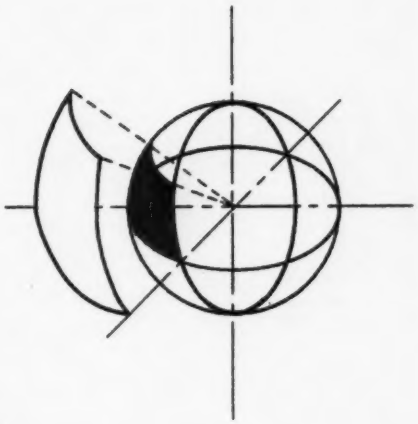
See (B) this KRW 100-ton Opposed Ram Automatic Press at work. Designed for compacting refractory materials, abrasives, powdered metals, etc. Equipped with shuttle feed, hopper mechanism and automatic lubricator. (Capacities range from 20 thru 750 tons.)

See (C) this new KRW 4-Column High Speed Downstroke Press in operation. Designed primarily in 10- thru 50-ton capacities for trimming operations (die casting flash, rubber, plastics, etc.). Basic design also adaptable to numerous operations such as light blanking, forming and die tryout.

CIRCLE INFORM-A-GRAM KEY NO. 40

Check Surface Plate Flatness . . .

by Applying the Geometry of the Sphere



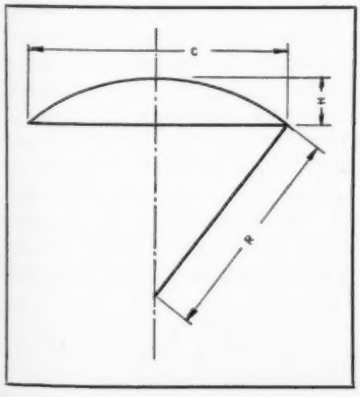
by R. J. Rahn
Research Director
Rahn Granite Surface Plate Co.
Dayton, Ohio

WHY SHOULD A surface plate manufacturer be interested in the geometry of the sphere? On first thought, one would say that his problem is flatness, i.e., a plane.

Plane Defined As Sphere With Infinite Radius

However, a plane may be defined in terms of a sphere, since it is a sphere with infinite radius. Nevertheless, a segment of a sphere, having a radius very much less than infinity, would make a very good surface plate. For example, a 2′ x 2′ surface plate, which has a maximum, uniformly curved error of 0.000050″, has been generally accepted as being a very good surface plate. The radius of a sphere, of which such a plate is a segment, may be calculated as shown below and in reference to Figure 1.

Fig. 1. $R = \frac{C^2 + 4H^2}{8H}$



$$R^2 = (1/2C)^2 + (R - H)^2$$

$$= \frac{C^2}{4} + R^2 - 2RH + H^2$$

$$R = \frac{\frac{C^2}{4} + H^2}{2H} = \frac{C^2 + 4H^2}{8H}$$

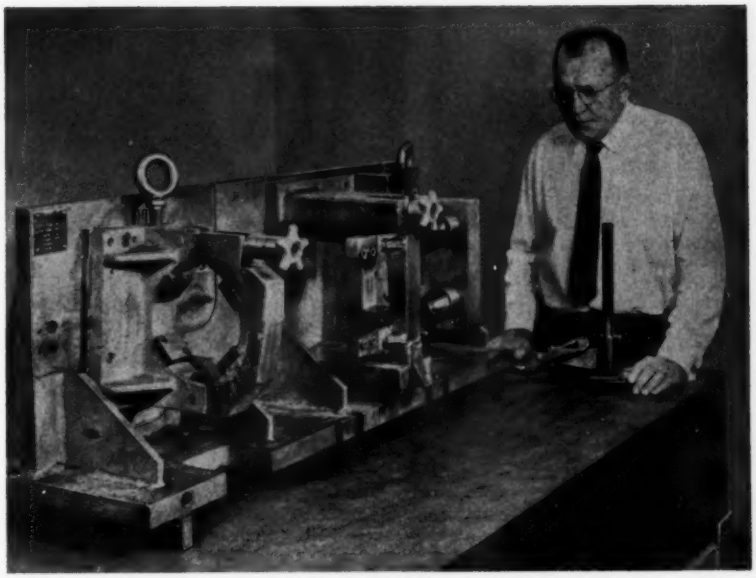


Fig. 2A

	Left	Center	Right
Readings	+0.0006″	0	+0.0004″
Tilt	−0.0001″	0	+0.0001″
Ends equalized	+0.0005″	0	+0.0005″

Using the values

$C = \sqrt{24^2 + 24^2} = \sqrt{1152}$
= (the diagonal of a 24″ x 24″ square)

$H = 0.00005$″

we get

$$R = \frac{1152 + (4 \times 0.00005^2)}{8 \times 0.00005}$$

$$= \frac{1152 + 0.00000001}{0.00040}$$

Fig. 2B

	Left	Center	Right
Readings	—0.0004″	0	—0.0004″
Tilt	—0.0000″	0	—0.0000″
Ends equalized	—0.0004″	0	—0.0004″

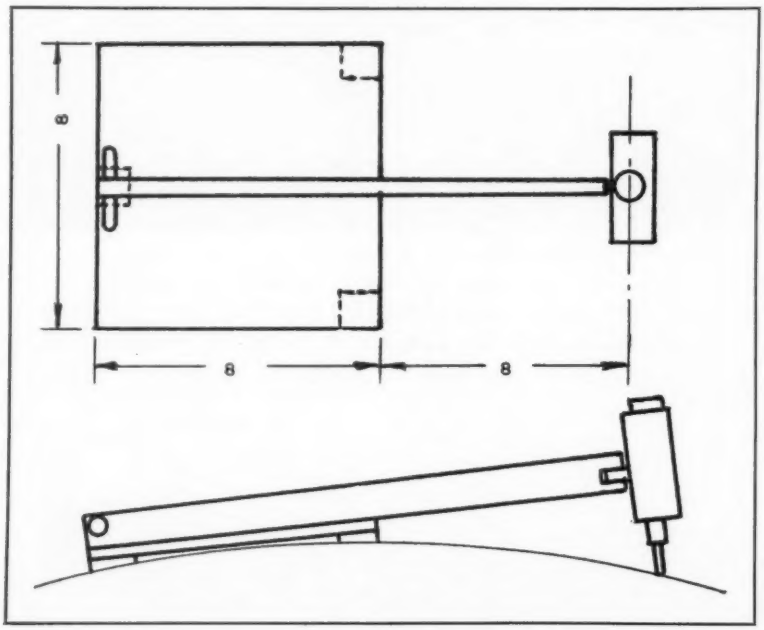
= 2,880,000.000025″
= 240,000.000002′
= 45.5 miles

While a 45.5 mile radius is a long way from infinity, it is still a large figure, especially when considered alongside of the few millionths of an inch used for precision tolerances.

Why A Sphere?

But why a sphere? Absolute flatness is impossible of attainment. Therefore, any variation from a perfect plane, no matter how slight, will result in either convex or concave spherical surfaces of varying radii, or a combination of convex and concave. A plate that has a fairly uniform convex curvature enables the user to take more accurate measurements than can be taken on a wavy plate, even though the total overall error on the latter is less than on the uniform convex plate. The reason for this statement is that everything is flexible—to a greater or lesser extent. Any tool, when placed on a surface plate, will sag somewhat in an attempt to conform to the surface.

Fig. 3. Spherometer



Workpiece Sags

The amount of permissible plate curvature which will contain such sag is greater than one would ordinarily think it to be. The amount that a given workpiece will sag may be determined as shown in Figures 2A and 2B. In Figure 2A, the workpiece was supported on two parallels near its center, and indicator readings taken under the center and also at the two extreme ends. In Figure 2B, the parallels were placed near the ends and indicator readings again taken under the center and under the two ends.

The ratio of the sag of the workpiece, when supported at the center, to the sag when supported at the ends, is in the proportion 1/8:5/24. A perfectly flat workpiece, therefore, would have sagged 0.00034″ when supported at the center and 0.00056″ when supported at the ends. This sag is not spherical, but is parabolical. The reason for the actual readings 0.0004″ and 0.0005″ was due to an error in the bottom of the workpiece, or on the surface plate, or both.

To insure that the workpiece will conform to a uniformly curved surface plate in spite of the parabolical sag and some error in the workpiece, it is desirable to limit the curvature per unit of area equal to the size of the workpiece to an amount less than the figures determined above. A simple rule of thumb which has proven satisfactory is to use half of the average sag on the two sag tests, i.e.,

$$\frac{0.0005″ + 0.0004″}{2 + 2}$$

= 0.000225″ in 44½″.

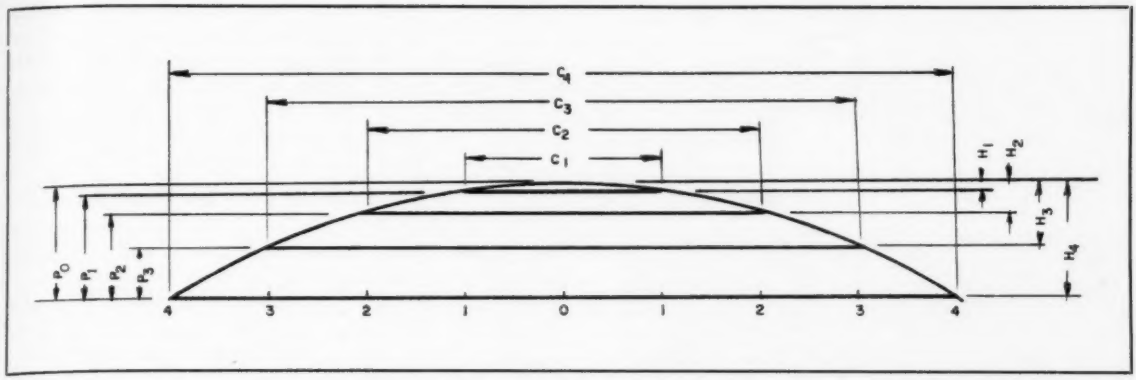


Fig. 4. Segment height is approximately proportional to square of chord length.

To make sure that the surface plate has no excessive humps and dips, a spherometer test, (Fig. 3) is also necessary. If this spherometer were set to zero on any spot on a perfectly spherical surface plate, it would read the same zero on any other spot. Such an instrument, or a height gage, with normal length arm and indicator extension, can be run all over the surface, and full indicator range noted. This F.I.R. should be not more than 1/10 the tolerance on the tools that will be inspected on the plate. For example, if the tool has closest tolerances of 0.00025", the F.I.R. readings on this check should be not more than 0.000025". If this check shows F.I.R. of 0.000025", or less, it is conclusive proof that all measurements taken on a job anywhere on the surface will repeat within 0.000025". Since the tool conforms to the plate, it is proof that *the measurements are accurate within 0.000025".*

Mathematical Calibration of Spherical Surface

The mathematically minded inspector may wish to determine the uniformity of curvature along a section of a surface plate which has been calibrated with the autocollimator or Planekator. The height from a chord to a mathematically perfect curve at any position can be determined by using a variation of the formula used above.

$$R = \frac{C^2 + 4H^2}{8H}$$

which becomes

$$H = \frac{C^2 + 4H^2}{8R}$$

With exceedingly minute values of H, as found in good surface plates, the value $4H^2$ is negligible compared to C^2, and may be dropped. Then

$$H = \frac{C^2}{8R}$$

and

$$\frac{H_1}{H_2} = \frac{C_1^2}{8R} \times \frac{8R}{C_2^2} = \frac{C_1^2}{C_2^2}$$

This proportion is proof of the theorem "For a given large radius and relatively small chord, the segment height is approximately proportional to the square of the chord length."

This is readily seen in Figure 4, where $C_2 = 2C_1$, $C_3 = 3C_1$ and $C_4 = 4C_1$. Therefore:

$$\frac{H_2}{H_1} = \frac{(2C_1)^2}{C_1^2} = \frac{4}{1} \text{ and } H_2 = 4H_1$$

$$\frac{H_3}{H_1} = \frac{(3C_1)^2}{C_1^2} = \frac{9}{1} \text{ and } H_3 = 9H_1$$

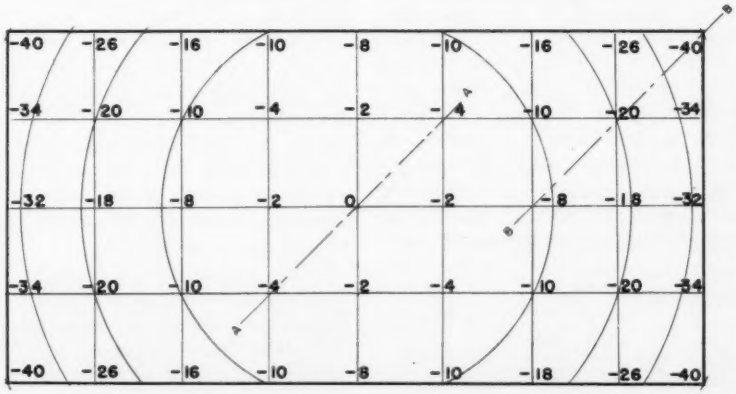
$$\frac{H_4}{H_1} = \frac{(4C_1)^2}{C_1^2} = \frac{16}{1} \text{ and } H_4 = 16H_1$$

When the total length of chord and maximum height is known, the same formula can be adapted to find the height from a uniform curve to the chord at any point.

$P_0 = H_4 = 16H_1 = 16H_1$
$P_1 = H_4 - H_1 = 16H_1 - H_1 = 15H_1$
$P_2 = H_4 - H_2 = 16H_1 - 4H_1 = 12H_1$
$P_3 = H_4 - H_3 = 16H_1 - 9H_1 = 7H_1$
$P_4 = H_4 - H_4 = 16H_1 - 16H_1 = 0$

This illustrates an interesting and useful feature of the geometry of the sphere. Note that from 0 to 1, the surface drops only $1H_1$. When moving out an equal distance, from 3 to 4, the surface drops $7H_1$. Apparently the surface

Fig. 5. Calculated calibration (in hundred thousandths) for a uniform 4' x 8' surface plate having a maximum over-all tolerance of 0.0004".



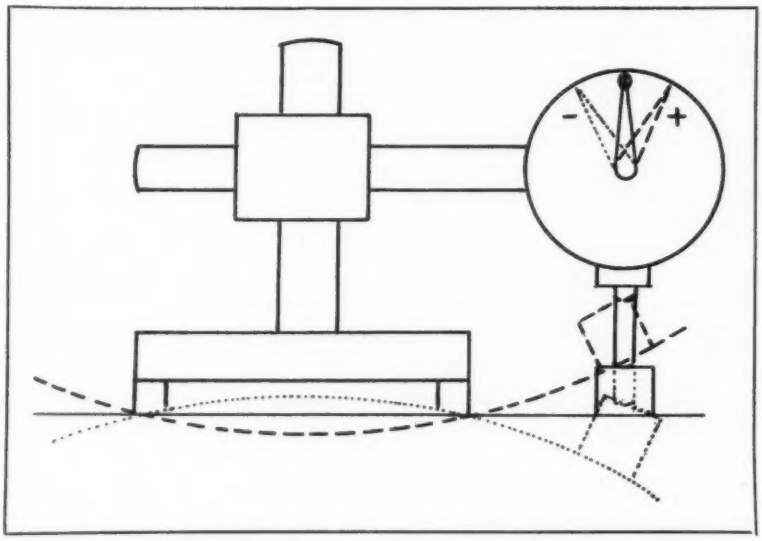


Fig. 6. Wavy surface cannot repeat measurements.

between 3 and 4 has seven times the error as the surface between 0 and 1. But this is not the case. The surface is the same at any spot, because it has the same radius at all points. A height gage located at 3 and set to zero on gage blocks at 4 will again read zero when placed at 0 with gage blocks at 1, or at any other similarly spaced positions. (Fig. 3)

Cylindrical Segment Not Desirable

The preceding constitutes a study along one section of a surface plate. A surface plate should be a segment of a true sphere and not a segment of a cylinder. In other words, it should have the same curvature in all directions. If the surface plate is square, the same curvature figures can be used for each centerline. But if it is an oblong, the maximum segment height must be different along the short width centerline than it is along the long length centerline. The segment height (H_w) across the width can be calculated, using the same proportions as above. For example, if the maximum segment height (H_0) along the diagonal of a 4′ x 8′ plate is 0.0004″, it should be 0.00008″ along the 4′ centerline,

$$(H_w = \frac{H_0 \times 4^2}{4^2 + 8^2} \times \frac{16}{80}$$
$$= 0.0004''$$
$$= 0.00008'')$$

and 0.00032″ along the 8′ centerline. (See Fig. 5)

Note that the errors on all similar segments of a perfectly curved spherical surface plate, as determined from planes tangent to the centers of the segments, are always the same.

Calibration along AA is	– 4	0	– 4
Calibration along BB is	– 8	–20	–40
Adding 20 to all BB readings	+20	+20	+20
	+12	0	–20
Tilting 16 about center	–16	0	+16
Same as AA	– 4	0	– 4

Uniform Curvature in All Directions Desirable

For accurate height gage measurements on a surface plate, it is essential that the curvature be uniform in all directions. Suppose, for example, that one of the diagonals on a surface plate had the full 0.0004″ tolerance, as shown on the calibration sheet (Fig. 5), but that the other diagonal had very little or no error. It would not be as good a plate as one which had the same 0.0004″ curvature along both diagonals and also properly proportioned curvature for all other areas. (Fig. 6)

Likewise, a surface plate that was concave along one diagonal and convex along the other, would be twice as bad. Of course, a wavy plate, i.e., a combination of convex and concave areas, could result in enormous measurement errors, depending on the closeness of the waves, the possibility of the workpiece bridging across peaks, and the length of the indicator arm on the height gage.

Surface Plate Specifications

For greatest value in a surface plate at lowest cost, calculate specifications as follows:

I. Determine over-all tolerance.
   1. Find sag in most rigid tool
   2. Divide by 2. Call this H_T
   3. Calculate over-all tolerance.

$$H_D = \frac{H_T \times D^2}{T^2}$$

(D = diagonal of plate
T = length of tool
H_D = over-all tolerance)

II. Determine repeat measurement accuracy.
   1. Find closest tolerance on jobs to be inspected on plate. Call it J.

Repeat measurement accuracy $A = \frac{J}{10}$

Inspection of Surface Plate With Ordinary Tool Inspection Instruments

When your surface plate arrives, you may not have an autocollimator, Planekator, or optical straight edge with which to check the over-all tolerance. Nevertheless, you can determine whether measurements taken on it are accurate. First, take your stiffest fixture and mount it on parallels, as shown in Figures 2A and 2B. With indicator dial set to zero at center for both tests, you should get a + reading at the ends when set up as in Figure 2A and a – reading at ends when set up as in Figure 2B. Such + and – readings prove that your fixture can conform to the curvature of the surface. (Note that + and – readings need not be equal.)

Next, take your height gage with maximum arm extension and measure a gage block all over the surface. If these measurements repeat within the grade needed, you can be sure that your measurements are correct. But if the measurements cannot be repeated, it is proof that the surface is not spherical and that the plate is not accurate enough for your product.

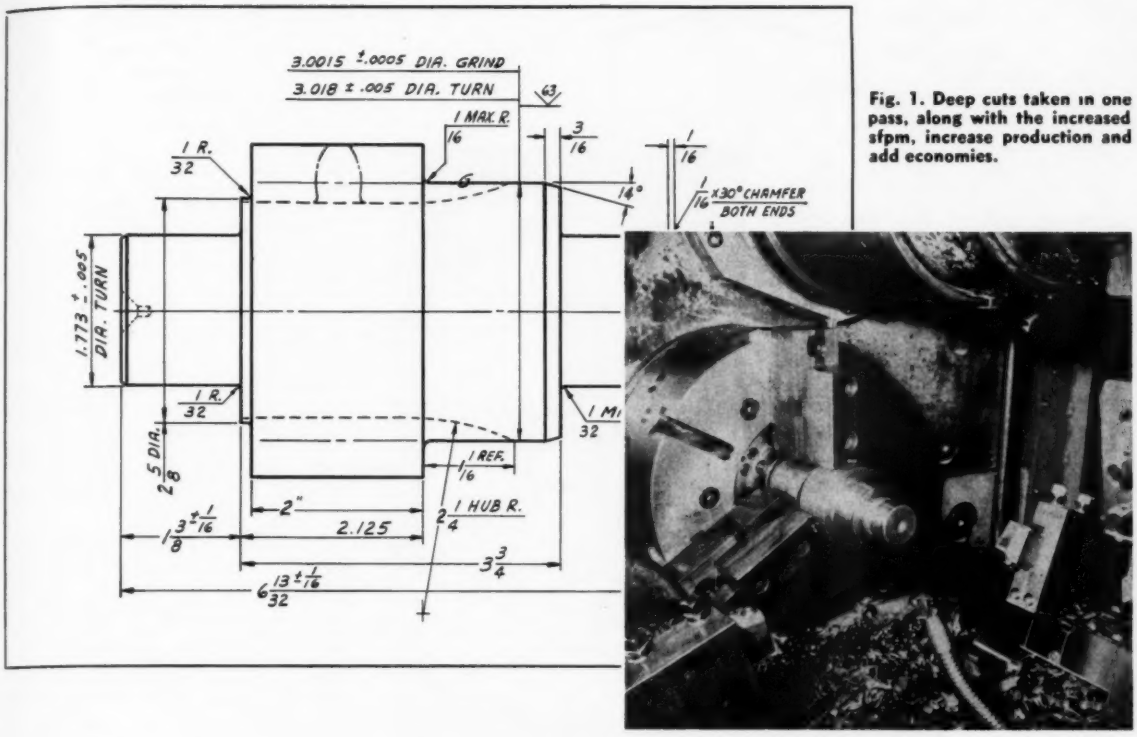


Fig. 1. Deep cuts taken in one pass, along with the increased sfpm, increase production and add economies.

Courage, A Password To More Production As

Adams Rev's Up Its Machines

by Howard E. Currier
and William E. Hoffman
Engineering Editor

Sales engineers should be more than order takers, and because some from Vascoloy - Ramet Corp. were, this success story can be told. Mr. Currier is a V-R sales engineer in the Indianapolis area.

This is not for the casual reader. It's for those who know metal removal, and those who need to know more.

AS A MANUFACTURER of earth moving equipment, workpieces of LeTourneau Westinghouse are large. Fast metal removal is important, but for years they used conventional speeds and feeds for stock removal (many plants still do)—until someone or some group had the courage to question convention.

Vascoloy-Ramet was called in to make a complete survey of metal

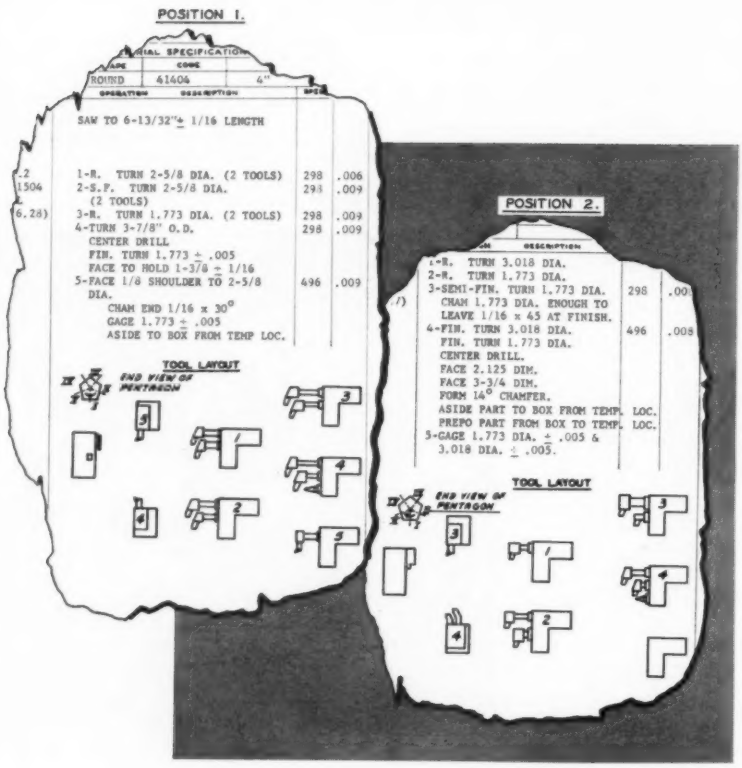


Fig. 2. Tool set up and process charts used in Operations 1 and 2 on part seen in Figure 1. Position 1 is turning left end diameters.

removal procedures at the Adams Division plant in Indianapolis. It was to include a look into management's philosophies as well as those of the machine operator. As you will see, results have been rewarding.

They are now machining much faster than was thought possible, and on the same machines. In a few instances they have bought new equipment. For the most part though, they have been able to apply new thinking to existing machines and increase production, necessary to maintain their position in a highly competitive market.

Now, hardly any jobs are run at less than 300 sfpm; most turning is done at 700 to 1000 sfpm, with some jobs turning at 1400 sfpm. The task was not accomplished overnight, however, it took approximately three years of hard work and education. Part of the answer was to put operators on an incentive basis — more parts, more money. Now operators continually ask the V-R man if they can go faster. In fact, this question is constantly "in the air."

Over and above the fact that production has gone up, an "extra" has been the fact that tooling costs have gone down. They learned that in many cases the faster the sfpm the longer the tool life.

A good example of fast metal removal is seen in Figure 1. The part thus far (to become a pinion gear) is machined out of a 4140 steel bar of 4" dia. It is turned on a 3AC Warner & Swasey in two operations at a constant 860 sfpm. The feed remains constant at 0.016"/rev for all diameters and cuts are taken at one pass using VR-97 ceramic throwaway tools.

To arrive at dimensions seen in Figure 1, ½" comes off the OD. Then for dimensions on the left, Operation 1, a 5/8" cut is taken to the 2-5/8" dia. Removal of 3/8" more stock gives the 1.773" dia. Each dimension is produced in one pass.

For dimensions on the right, Operation 2, 3/8" stock is removed to obtain the 3.018" dia. Then 1/2" is removed for the 1.773" dia. Here again, these dimensions are produced in one pass — chips hit the machine guard like popcorn.

Another good example of in-

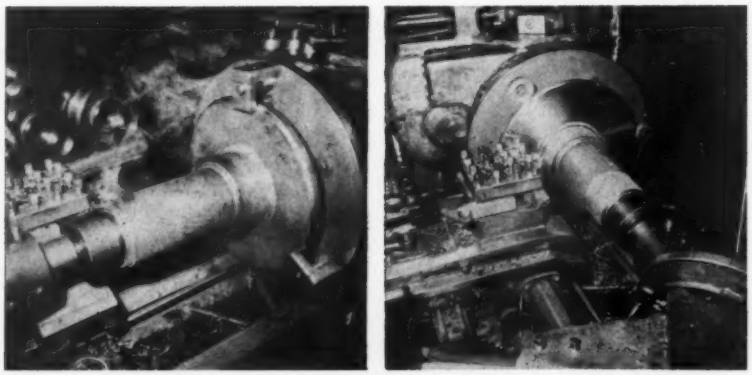


Fig. 3. Turning on both large and small diameters is done at the same rpm. The micro-finish achieved eliminates a grind operation.

creasing surface cutting speed is seen in Figure 3. Before, when this inner axle carrier was machined, grindstock was left on the two bearing diameters and the faces. These surfaces were later ground to a 25 micro-inch finish.

In April, Adams began to think in terms of achieving the finish without grinding. When asked if it could be done, the V-R engineer just shook his head but he agreed to try. It was done, and on an older 3A W&S, running at 850 rpm.

The 17-3/8″ dia disk is welded to a 5-3/4″ length of seamless tubing. Turning is then done on both large and small diameters at the same rpm. This in itself is a good trick, but imagine trying to achieve a 25 micro-inch finish with that large dia tending to vibrate. They have done even better than 25 micro using VR-97. They are getting 22 on the smaller dia with an 18 on the larger one.

It's worth noting again that Adams is doing most of their high speed turning on existing equipment. However, this does take good planning and the proper setup for each job. Rigidity is a prominent factor too, and tools must be arranged for a minimum of overhang. Proper part support is also important.

There are many other examples of the trend at Adams: On a radial drill, they now rough and finish bore burned-out holes with ceramic throw-away tooling. On another job they form a 4-1/2″ dia draft ball by roughing 5/16″ deep at 630 sfpm with a 0.020″ feed, while finish cuts are taken at 1350 sfpm with a 0.005″ feed.

If turning successes like this are possible, it's hard to understand why many shops are still running new machines in the 200 to 300 sfpm range. In most cases they could turn faster and produce more. Do they lack imagination, know-how, or courage?

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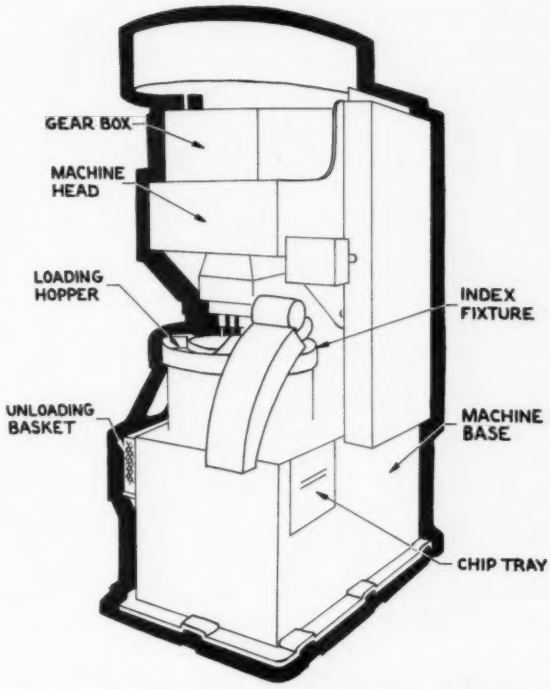


Fig. 1. Principal parts of the first multi-spindle nut tapper.

Welding-Up A Machine

by Charles Janki

This article is based on an award-winning paper submitted by Mr. Janki, chief engineer at Zagar, Inc., Cleveland, to the James F. Lincoln Arc Welding Foundation.

WE SET OUR SIGHTS on the production of a multi-spindle nut tapper having a production rate of 25,000-75,000 nuts/hr. Nothing encourages like success (which we have had with multiple spindle machines), so with the single spindle nut tapper only producing 500-5,000 nuts/hr, we had good reason to proceed. We elected to design a unit to tap from 5/16″ through the 1/2″ nut sizes.

A prototype was built to mechanically tie in the various functions and to afford perspective for engineering in design of the production model.

All components from the base to the top were arc welded steel plate. From our considerable experience with weldments we knew what to expect in the way of strength, rigidity, design flexibility, and weight reduction. We knew also this can result in considerable savings. Steel plate at 15¢/lb plus fabricating labor invariably costs less than semi-steel castings at 35¢ to 50¢/lb plus the cost of patterns.

To take further advantage of welding, we aligned ourselves with a fabricator who is an expert in his field. We have arc welding

equipment for our own miscellaneous uses, but when welded parts of any substance are required we rely on the workmanship of the professional. He has become well acquainted with our products and often makes recommendations that enable us to get even more from our welding dollar.

After consideration of power input, cycle time, tapping head, and spindle sizes, we decided to use 79 spindles in our nut tapper.

The fixture was designed so that 79 nuts would always be available in the work station. It's a dial type, designed to move to the spindles for tapping.

Bosses, welded to the bottom of the fixture, house the lead screw anchor, while additional bosses welded to the fixture table contain lead screw bushings.

The loading hopper and belt guard for the volumetric mixer-loader are both welded-up 16 ga steel.

The chip chute is funnel shaped and of 16 ga welded construction. It's open at the bottom to allow the chips to pass through, and is fastened directly under the work station. Chip disposal is almost 100% efficient since the spiral-point gun taps project the chips ahead of the tap.

A machine capable of tapping 50,000 nuts/hr produces quite a few chips, so the base of the machine has a full opening across its width. This is for automated chip disposal, using a standard conveyor, if needed.

A machine with production capacity such as this could conceivably produce a lot of scrap in a short time — thus the inspection tray. It is made of 14 ga with nests or nut cavities. It's positioned between the tapping and the unloading station for the purpose of catching a batch of nuts for periodic inspection.

Required for catching finished nuts, the unloading basket is constructed like the chip tray. Here again, if desirable to automate, finished nut removal can easily be accomplished with conveyor equipment across the front of the machine.

Consideration was given to the possibility of having the gear-box-shell cast in semi-steel, but this was soon dismissed. After having constructed our first gear box, we knew refinements and changes were sure to come. In view of this, pattern change costs would be prohibitive. So we stuck to welded construction throughout.

The machine base and the machine head, both weldments, comprise the superstructure of the machine. There was no queston about their construction; the only alternative was to cast them. So, the only job for the machine designers was to design for function only.

The base required open top construction to allow tilting the machine head, and internal construction included cross bracing to tie the side-plates together. Other members were added to mount the air cylinders, valves, hinge pins, coolant tanks, and miscellany. Open front design provided area to mount the tapping fixture.

The head was constructed very much like the base in that it has two main side-plates tied together with cross-plates.

Beneath its horizontal plate we mounted the multi-spindle tapping head. The gear box was mounted above. Adjacent and vertical is the motor mount plate. Side-plate bosses were bored to accept hinge pins for tilting the head. With the usual reinforcing ribs and extra bosses, the weldment was complete.

Normally, tapping done with straight shank taps requires that the taps run in until the threads are completely cut then their rotation is reversed for the out stroke until they clear the hole. Lead screws are used to govern feed rate and vice-versa. Both movements are at the same rate per revolution as the pitch of the tap thread.

Our multi-spindle tapper with the tapping head stationary, and the lead screws driven by the head, operates by raising the work

Fig. 2. Here the head is tilted back for inspection or replacement of taps. Note the clean design and ample rigidity possible with welded construction.

Mr. Janki says: *"It is difficult to accept the fact that engineering ingenuity has failed to explore the use of multiple spindles in its efforts to increase tapping machine output. Machine designers have 'ganged' spindles to perform every other type of operation, but they have—until this time—failed to market a fast nut tapper.*

"Tapping machines have been of two types: Those using the bent shank tap and those using the straight tap. To the best of my knowledge, there is only one machine with more than one spindle—and it only has two."

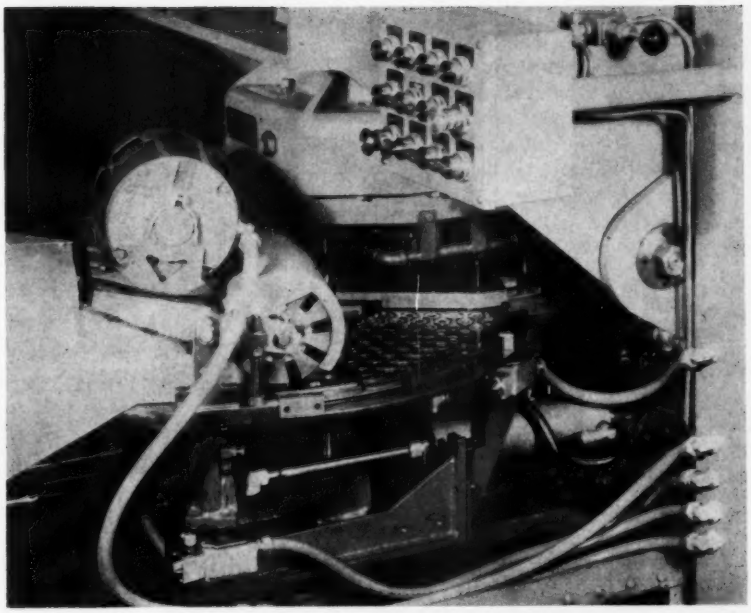


Fig. 3. A view of the volumetric mixer for nesting parts.

(fixture) to the taps. It is necessary to stop lead screw rotation so that the fixture can index to the next cycle.

On the input side of the gear box, we have a motor with only 25% of the horsepower necessary to do the tapping. From it, V-belts drive a flywheel pulley on the end of the input shaft. The motor, the flywheel, and the shaft rotate constantly in one direction only. The work cycle consumes only 15% of the total cycle time, so the constant rotation of the flywheel enables it to store sufficient energy to make up the difference between that required for tapping and the actual HP available. This works well with the proper gears and electric clutches. As we proceed with the development of additional machines, we are more than grateful for our conviction to use weldments.

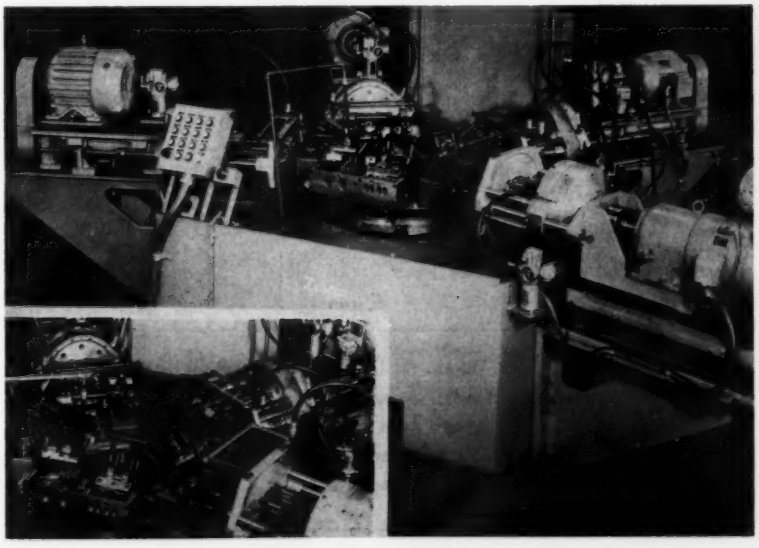
Extra copies of this article are available while supply lasts. Write Tooling & Production Magazine, 1975 Lee Rd., Cleveland 18.

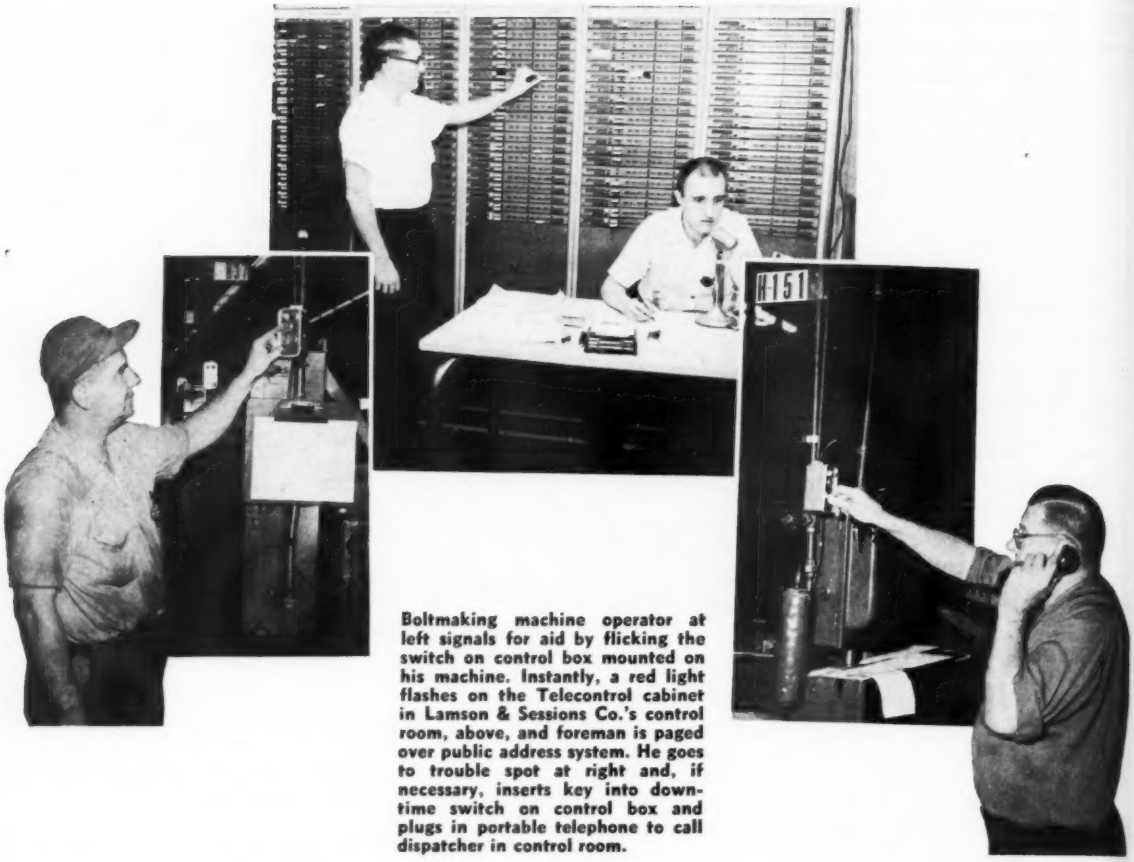
Same Four Heads For Thirteen Jobs

Interchangeable fixtures on a new Zagar setup allow 13 different jobs with different hole patterns to be drilled, countersunk, reamed, and tapped with the same four drillheads. Each of the three removable tables has four work stations and one load-unload station.

Four parts are placed in each jig of each station. The station sequence is drill, drill and countersink, ream and spot face, and tap, by individual lead screw for close depth; 61 holes are processed.

The machine, producing 700 pcs/hr, was designed and built by Zagar, Inc., to operate on a completely automatic cycle, with manual load-unload. Heads are fed by 7-1/2 hp, 10" stroke Zagar units.





Boltmaking machine operator at left signals for aid by flicking the switch on control box mounted on his machine. Instantly, a red light flashes on the Telecontrol cabinet in Lamson & Sessions Co.'s control room, above, and foreman is paged over public address system. He goes to trouble spot at right and, if necessary, inserts key into down-time switch on control box and plugs in portable telephone to call dispatcher in control room.

Machine Monitors Lead to a 'Methods Inventory'

– – and more efficient operations

An On-The-Scene Report
by Charles Weiner
Assistant Editor

Management's approach to in-plant production communication, production scheduling, and tool maintenance at Lamson & Sessions Company has paid off in terms of reduced down-time, smoother production, and a steady flow of tools and materials in the plant. Here's how.

KEEPING TABS ON THE PRODUCTION STATUS of 200 heading, boltmaking, and thread rolling machines, a job that would ordinarily keep a small army of supervisors hopping, is done by two men at Lamson & Sessions Co.'s modern sprawling plant in Cleve-

land. From a control room in a remote part of the plant, they monitor the production of each machine and dispatch men and materials as needed.

Backbones of the system are 10 Telecontrol units — each one connected to 20 machines — that keep a running tally of the production of each machine, record running time and downtime, and flash a red light to indicate when aid is needed at a particular machine. The installation and a tool delivery system used with it has enabled the company to cut downtime and expedite tool repair and flow of materials in the plant.

The company's effective use of the monitoring equipment is only one phase of the new approach to production scheduling and control. Management first began to take a close look at the problem when the company moved into its $6-million plant 2½ years ago. The cold heading and the hot forging operations, previously done at two separate multi-story plants, were combined under one roof in the new plant. Methods used in the two smaller plants were no longer adequate, so new procedures had to be established to coordinate all of the manufacturing processes.

Acquisition of the Telecontrol installation helped speed production communication in the plant and at the same time focused attention on problems that had to be solved. Luke Case, Production Scheduling Manager, points out that the investment in the monitoring equipment and the resulting need to use it effectively spurred management to reappraise many systems and methods.

The "methods inventory" resulted in a new tool control system, improved paperwork procedures, and a general awareness of production goals and the problems involved in attaining them. "We did some serious thinking and made rearrangements in a period of three or four months that would have taken years otherwise," says Case in describing the changes.

A modern plant and modern equipment do not automatically yield benefits. They are "tools" which can increase the potential for efficient, economical production; to realize the increased potential they must be used effectively. In the process of learning to use these tools, Lamson & Sessions management gained an up-to-date knowledge of plant procedures and problems and defined their objectives more clearly. As a result, they have combined the production monitoring and in-plant communication system with auxiliary systems to expedite the cycle from raw materials to threaded and headed parts.

Making Paper Useful

One of the first areas for consideration was the routing of orders. Management found that the old routing slips did not contain sufficient information for use with the monitoring system. They did not specify where the particular operation was to be done and how much time was required to do it. So, the form was revised to include this information.

A duplicate of the revised form is now inserted in a slot next to the Telecontrol register corresponding to the machine that is working on the order. When the machine run is completed, the figures on running time, downtime, and parts produced are transferred directly to the card.

The information on the new form is also useful for cost accounting and machine loading.

Expediting Tool Repair

Tool repair procedures at L&S came under scrutiny as well. In a plant where 110-130 tons of bolts are put into process each day, downtime for tool service can be a major bottleneck. Previously when an operator ran into tool trouble he shut down the machine, walked to the tool crib, obtained a rework order, took the tool and rework order to the toolroom, and waited or returned for the reworked tool. Often a machine would be down four or five hours.

Now the company's tool delivery system reduces downtime by about 70% and provides the basis for an efficient tool inventory program. When the operator needs help he merely flicks the alarm switch on the control box mounted on the machine. A repeated beep-tone in the control room directs the dispatcher's attention to the control cabinet, where a blinking red light indicates the machine needing attention. The dispatcher calls out the machine number over the plant public address system, and the foreman follows this message and arrives at the machine in a matter of minutes.

If tool trouble is indicated he inserts his key into the downtime switch on the control box, plugs in his portable telephone, and asks the dispatcher to send a tool delivery man to the machine.

Within seconds, a call for a tool delivery man goes out over the P.A. system. He picks up the tools at the machine and takes them directly to the toolroom, where he gets a "tool promise" or estimate of when the tools will be ready for pickup. This information is transmitted back to the foreman enabling him to reassign the operator, if necessary.

When the tools are reworked, the toolroom foreman calls the control room and the tool delivery man is dispatched to deliver them to the machine. At the same time, the foreman is notified that the tools are on the way. Idle machine and man time is thus reduced to a minimum.

No Waiting For Setup

Another important function of the tool delivery man is to pick up the tools from the previous setup, return them to the toolroom, and deliver the tools for the next set-up to the machine. This is done when the Telecontrol part counter shows that the job has gone off of "set-up" and is running.

The tool delivery system also aided management in their tool control program. A tool control card was established to give a record of tool life, scrapped tools, and other information necessary for tool inventory and ordering.

Machine Status Check

In addition to its function as a communications and expediting tool, the production monitoring system keeps Lamson & Sessions

supervision informed of the status of the machines in each department and the production effectiveness of each one. Data on the condition of the headers and boltmakers, the number of pieces produced, and the elapsed running time is taken from the Telecontrol registers at the halfway point of each shift. The foremen are reminded which machines are down, why they are down, and how long they have been in that condition. They also get a report on the production effectiveness of all machines that are running at the time of the half-shift check.

The dispatcher determines the effectiveness or running variance by dividing the scheduled hours the machine has produced (time allowed per 1000 pcs x No. of 1000 pcs produced) by the actual hours it has been running. The necessary information for these reports is readily available from the control registers for each machine. Armed with this information, the foremen can attempt to overcome any bottlenecks in their departments before the shift is over.

The company is now in the process of developing a new payroll system which will use Telecontrol-organized data to save time and paperwork. Their outlook for the future is summed up by Luke Case when he says, "The information is available and we are going to make good use of it."

Extra copies of most articles are available on a first-come first-served basis. Write Tooling & Production Magazine, 1975 Lee Rd., Cleveland 18. Be sure to mention the article you want.

From the Cover:

Versatile New Jig Boring / Milling Machine

THE LARGE CAPACITY and versatility of the new Gorton vertical jig boring/milling machine recently installed at the National Cash Register Co., Dayton, facilitates new model work and other limited run operations. Its precision drilling and boring capabilities, in addition, are materially reducing the time required to produce prototypes, tooling plates, templates, and the like.

Vernac optical units (they're red in the cover illustration) simplify location of holes within ±0.0005" limits on the 36" x 54" table. Handwheels are used when positioning with these optical scales.

Designed on the building block principle, the machine has a Gorton 1-22 Mastermil head and spindle assembly with #9 B&S taper. The spindle is powered by a 2-hp motor, providing 20 speeds from 40 to 5600 rpm. Spindle power feed is infinitely variable, 0 to 5 ipm. The vertical slide is designed to take a considerably larger horsepower spindle and head if required. Likewise, greater cross range or clearance between spindle nose and table top can be handled easily.

The base and column units of the machine are stress relieved weldments, and the cross and vertical slide ways are scraped Meehanite. Rectangular openings in the front of the base are for exit of chips falling between the cross-slide ways.

The vertical slide is positioned by manual handwheel. The slide weight is offset by a counterweight, moving in the vertical column. A slide lock is provided for fixed milling and boring operations.

The saddle and table motions are actuated by two hydraulic motors, which provide variable feed tranverse rates of 1-30 ipm and push-button rapid traverse to 60 ipm. Feed rates are controlled by the two flow-control valves at the right front of the machine. Both cross and longitudinal hydraulic motors can be operated simultaneously for rapid positioning.

The Special Machine Division of the George Gorton Machine Co. designed and built this machine.

###

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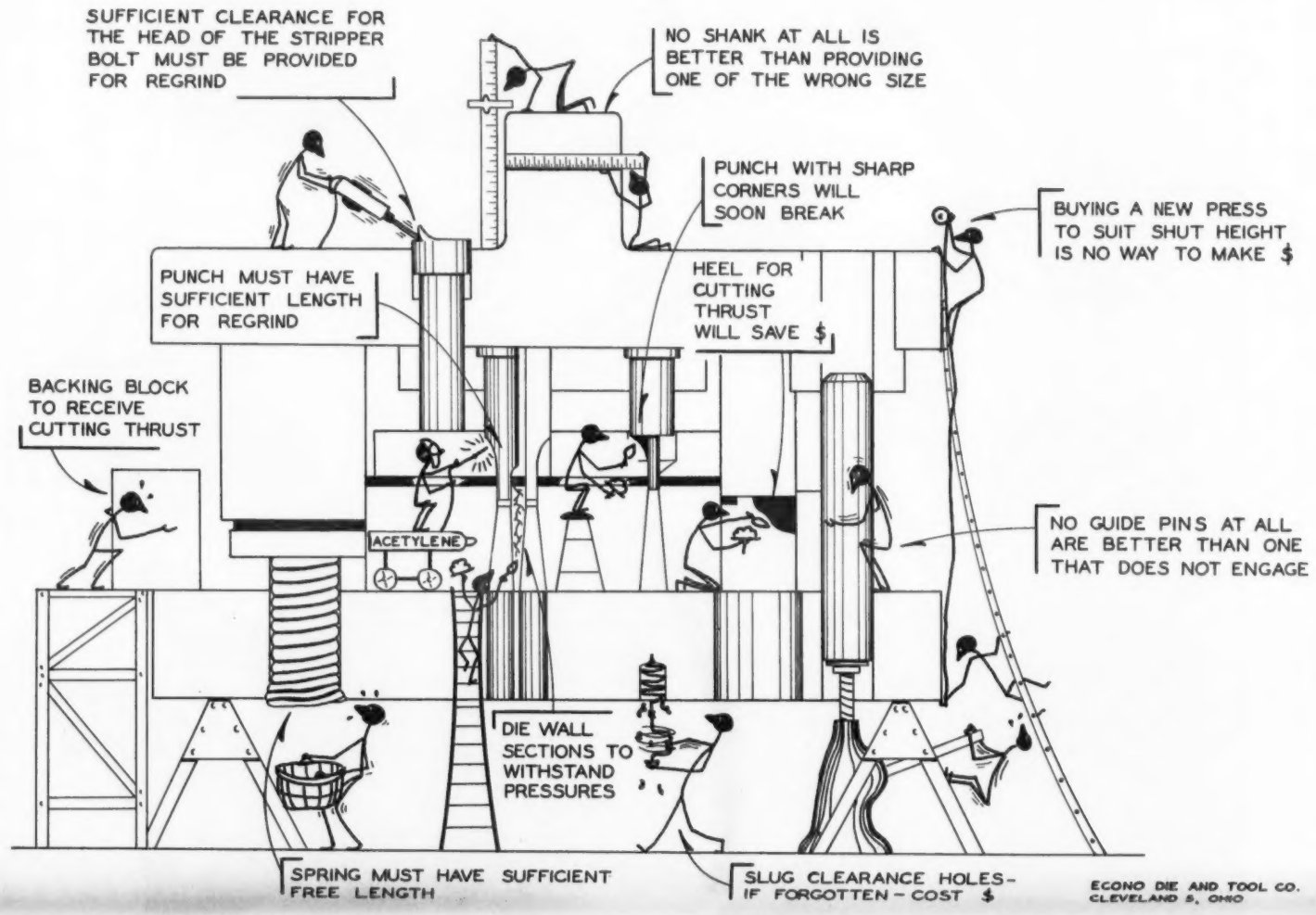
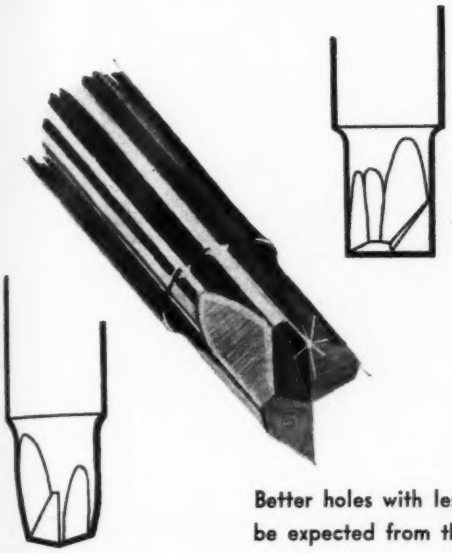
Just a Few Points on Tool Design


SUFFICIENT CLEARANCE FOR THE HEAD OF THE STRIPPER BOLT MUST BE PROVIDED FOR REGRIND
NO SHANK AT ALL IS BETTER THAN PROVIDING ONE OF THE WRONG SIZE
PUNCH WITH SHARP CORNERS WILL SOON BREAK
BUYING A NEW PRESS TO SUIT SHUT HEIGHT IS NO WAY TO MAKE $
PUNCH MUST HAVE SUFFICIENT LENGTH FOR REGRIND
HEEL FOR CUTTING THRUST WILL SAVE $
BACKING BLOCK TO RECEIVE CUTTING THRUST
ACETYLENE
NO GUIDE PINS AT ALL ARE BETTER THAN ONE THAT DOES NOT ENGAGE
DIE WALL SECTIONS TO WITHSTAND PRESSURES
SPRING MUST HAVE SUFFICIENT FREE LENGTH
SLUG CLEARANCE HOLES - IF FORGOTTEN - COST $
ECONO DIE AND TOOL CO. CLEVELAND 5, OHIO

Editor's Note: Scrounged from eight years back — and it took some doing! Early this year a reader requested several copies of this sketch which first appeared in the July 1952 Tooling & Production. He wanted them for his apprentices. The best way to get duplicates for him was to make a new plate and run it again. So, if your apprentices would like a copy for their notebooks, just let us know — before we lose it again, that is!

E. W. P.



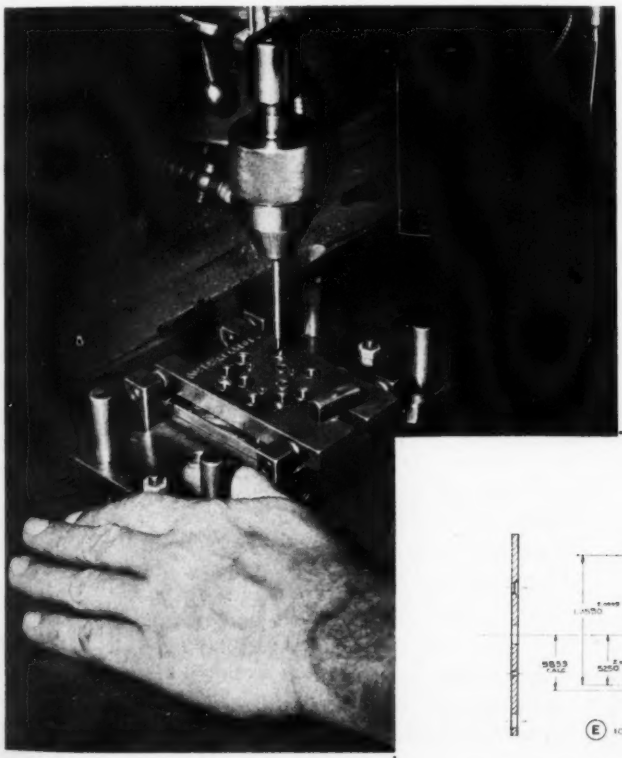
More Precise Holes Less Cost Per Hole

. . . Ream With Solid Carbide

Better holes with less scrap and minimum tool breakage can be expected from the use of solid carbide reamers.

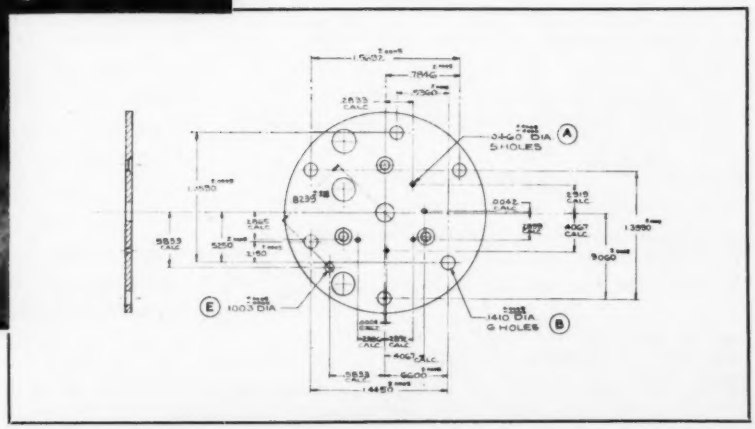
by Donald A. Tiffany

Mr. Tiffany is a Tool Engineer at the Link Division of General Precision, Inc., Binghamton, New York.



WHEN FIRST INTRODUCED to us, we expected these solid carbide reamers to be costly to use. This thought was soon put down; in reality they were found to be inexpensive. In addition, we enjoyed increased precision, increased pro-

Fig. 1. Reaming about to begin. Part drawing showing holes A, B, and E are to be jig ground. Other machined holes are not specified on this drawing.



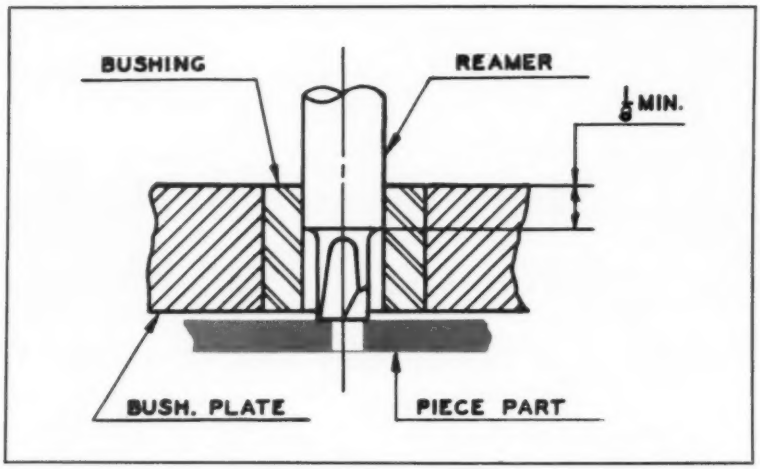


Fig. 2. Reamer about to enter the work. Note piloting before cutting starts.

duction, and found our jig bore work to be minimized.

In the length of time we have used solid reamers not one has seized in its guide bushing. Before solid reamers, we used a carbide insert with a steel shank for a bushing pilot. About 25% of the insert type would seize in the bushing and, in most cases, both bushing and reamer were damaged.

We ream most metals, including some grades of stainless steel and a few special alloys like tenzalloy. We have also had good success with the softer metals such as brass, bronze, and aluminum.

Since starting to ream in this way, our hole sizes have been from 0.0463 to 0.6257" dia in from 1/32 to 7/8" thick stock. All reamers below 0.5000" dia have 2 flutes; larger sizes work best with 4 flutes. Our flute lengths vary from 7/32" for the smaller diameters to 9/16" for the larger, although some reamers have 1" long flutes for special work. They are supplied by Grawell Carbide Tool of Detroit, with a 4 rms finish.

We find it best to grind the jig bushings in place, removing about 0.005" to arrive at a fit with the reamer. This also brings the bushing hole location to correct position with 0.0002" total tolerance.

The ID's of our smaller bushings are held to +0.0001", —0.0000"; we open up on the larger ones to +0.0002", —0.0000". Even so, we have good location since the shank or guiding diameter of the reamer is held to the reverse of these tolerances — they are ground to +0.0000", and —0.0001", and although these tolerances give a maximum clearance of just 0.0003" only about 5% of our work requires special coolants.

We arrange our work in the jig so that the reamer is piloted for a minimum of 1/8" when it starts to enter the workpiece. This is easy to understand as reamer speeds go up to 20,000 rpm. Reamers up to 1/4" dia are turned at the faster speeds, while the larger sizes may be run as slow as 800 rpm.

As an example of tool-life, it is not unusual for the smaller ream-

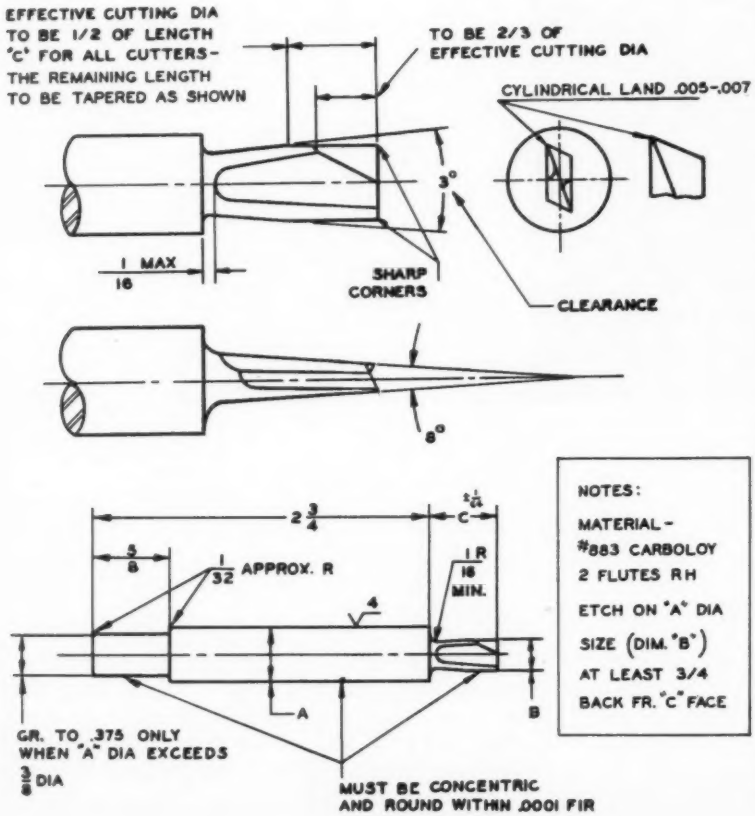


Fig. 3. Views of a solid carbide reamer, showing specifications. Although there are some variations as to grind, principle of operation is the same.

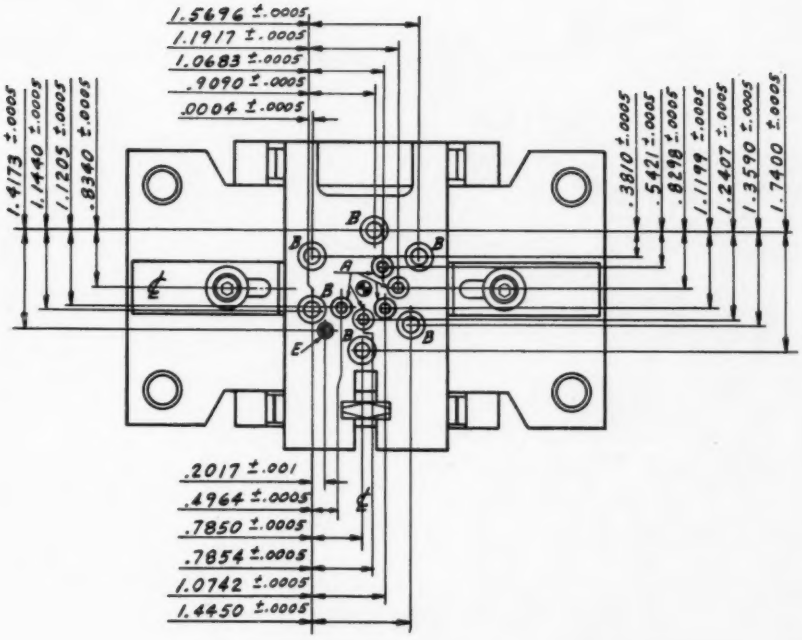


Fig. 4. Plan view of the reaming fixture showing jig bore dimensions. Holes not requiring jig grinding, for that added precision, are omitted.

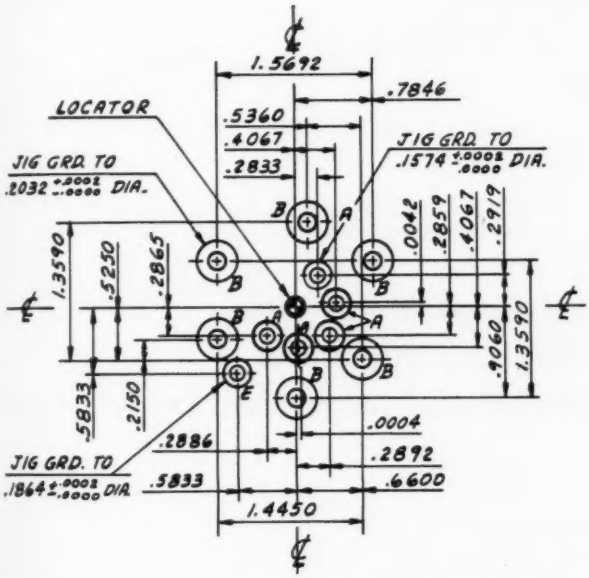


Fig. 5. Layout for jig grinding. Here again, only holes to be jig ground are specified. Location tolerances are understood to be ±0.0002".

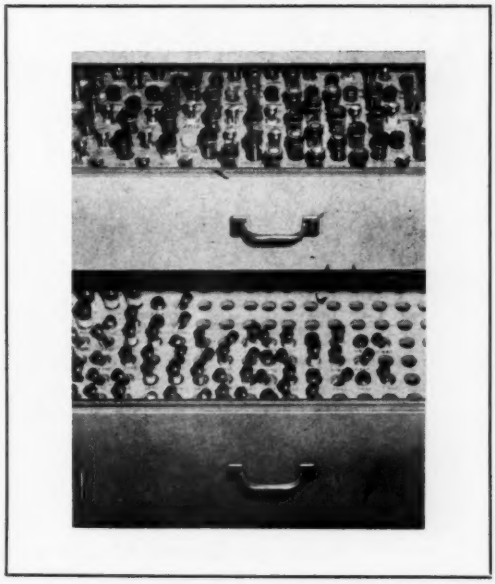


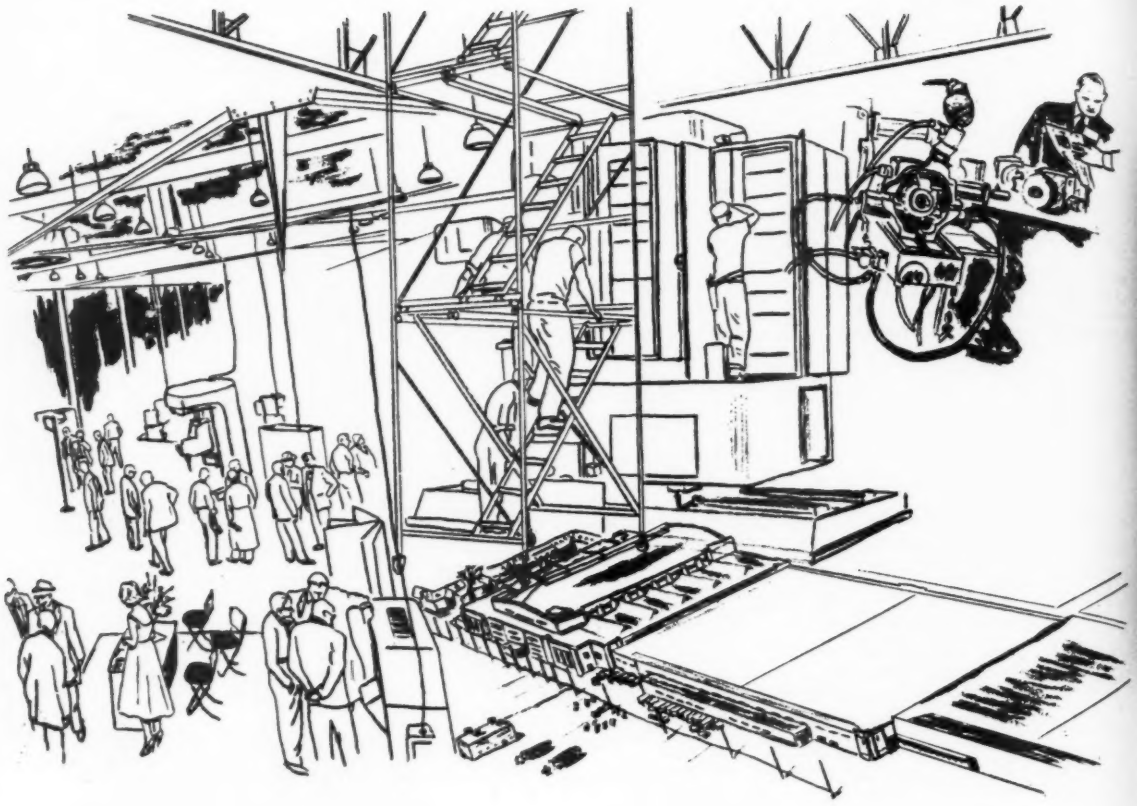
Fig. 6. Each reamer warrants its own container. Storage in this way provides safety and easy use.

ers to produce up to 40,000 precision holes before resharpening. The larger sizes perform equally as well.

Drill jigs for use with these cutting tools are made by using two layouts: 1) A jig bore layout is first used to bore holes for the bushings which are undersize on the ID. Locations here are held to ±0.0005". 2) The other layout shows only dimensions for those bushings that are to be jig ground. Here the tolerances are ±0.0002" for location, and size is according to previous tolerance recommendations.

As pictured, each reamer is stored in its own container and kept in a special place. Only two people handle these high performance tools from which we make better holes, have less scrap, realize low maintenance, and have high production at a low unit cost.

Extra copies of this article are available while supply lasts. Write Tooling & Production Magazine, 1975 Lee Road, Cleveland 18.



Previewing the Chicago Shows

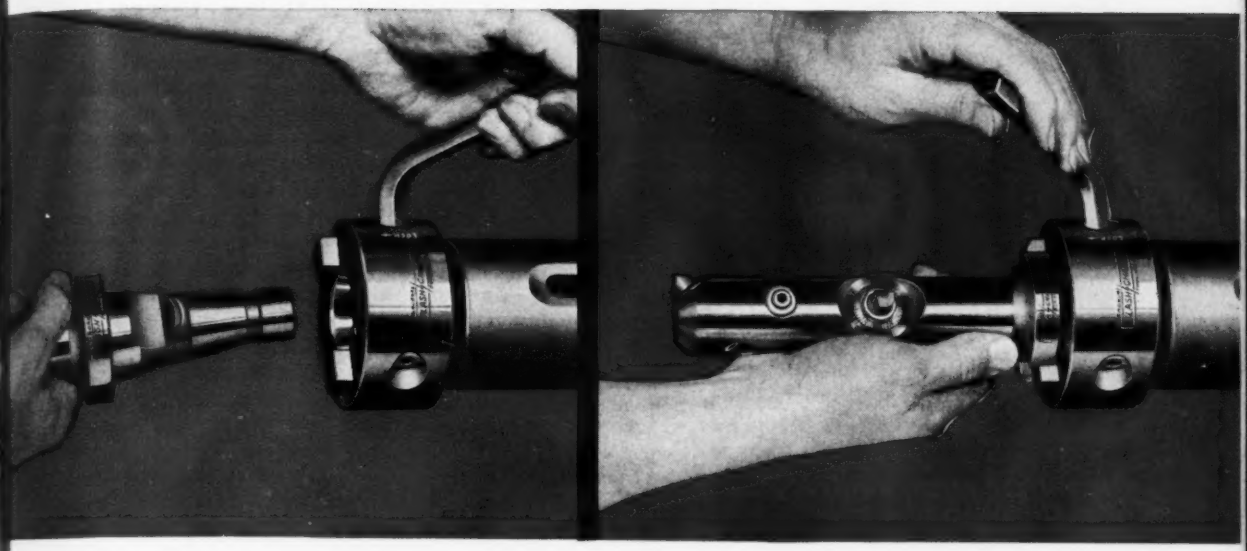
- **Machine Tool Exposition - 1960**
- **Production Engineering Show**
- **2nd International Coliseum Machinery Show**

MORE THAN 100,000 machine tool users and scores of manufacturers and sellers will be pounding the pavement after Labor Day. They'll be walking through acres of production equipment and accessories on exhibition in Chicago, Sept. 6-16. Advance information on the lineup of machines and gadgets at three shows there is generating among many the kind of excitement associated with the impending arrival of one of Barnum & Bailey's three-ring extravaganzas.

The exhibition halls in Chicago will be crammed full of the results of the blend of production know-how, cost-conscious design, and bold imagination. Translated into terms of "synchronized assemblies of hardware," this means better methods for making better products more efficiently.

The thread running through all the shows will be emphasis on accuracy, reliability, and more production per machine. They'll be a reflection of the developments of

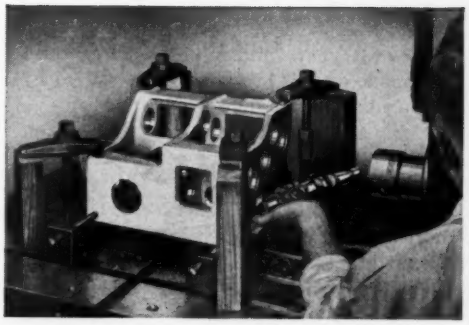
change tools in seconds! retain exact diameter settings . . .



WITH MICROBORE FLASH-CHANGE SYSTEM!

Flash-Change permits a boring bar, set to a specific bore diameter, to be changed in seconds for other machining operations. Again and again, the bar can be quickly repositioned in the machine to accurately duplicate the original operation without further adjustment.

Flash-Change tooling includes a complete range of boring, drilling and milling equipment readily adaptable to any machine, or from one machine to another, by means of a simple Flash-Change Tool Holder with driving shank to suit the machine spindle. In addition to Flash-Change, the Microbore System includes a complete range of Standard Boring Bars. Special Cluster Bars can be furnished upon receipt of a part print and engineering data.



Shown is a cast iron gear box machined with Flash-Change tooling on a production basis. Production time substantially reduced. Bore diameters duplicated to extremely fine limits.

For complete information on a tool system that can greatly increase your production standards and profits, write for Catalog No. 58.

DeVlieg Microbore System

DE VLIEG MICROBORE • DIVISION OF DE VLIEG MACHINE COMPANY
Fair Street • Royal Oak, Michigan

CIRCLE INFORM-A-GRAM KEY NO. 59

How Can New Machines Cut Costs?

Mr. Stickell

IDLE CURIOSITY and active imaginations may make metalworking managers flock to September's Machine Tool Exposition (and other shows), but the real force driving them to Chicago will be the compelling need to reduce costs. Somewhere in the impressive displays of modern machine tools and accessories, each one designed to get more production per manhour, they hope to find the answer to their productivity problems. In effect, each visitor will be a delegate to a cost-cutting convention, with the task of selecting the best way to make better products at lower costs.

The importance of the Exposition is pointed up by Grayson M. Stickell, President and General Manager of the Landis Machine Co., who says that better machines are the *only* answer to cost problems. He says that there is little chance of cutting costs in the areas of taxes, materials, administrative and sales organization, product, and wages. Stickell points out that the solution is increased productivity, or more output per manhour. As men produce more, unit costs go down, and the way to get more production per manhour is to give men better machines.

How can new machine tools cut production costs? The answer, he says, depends on the nature of the present equipment within the plant, and the kind of operations performed. In general, however, there are areas of cost-reduction that are well established by experience. Stickell suggests that cost-conscious manufacturers investigate these areas:

Previewing . . .

the last several years and a preview of what to expect in the period just ahead — a barometer of metalworking's present and future. Here's a glimpse of what to expect in Chicago in September:

At the Machine Tool Exposition-1960, more than 130 members of the National Machine Tool Builders' Association will exhibit more than 1000 new machine tools. The familiar hum of chipmaking and metal forming will make visitors feel right at home; the exhibition halls of the International Amphitheatre will resemble a giant machine shop.

Mixed in will be the staccato clicking of numerical controls as they direct machines through sequences of production operations. Numerical control is certain to be the show-stopper at Chicago. It is estimated that 100 different numerically controlled machines made by 40 different manufacturers will be clicking away at the Exposition — proof that N-C is more than just a trend.

Weary feet can be rested during the ride on a special bus from the Exposition to its companion exhibition, the Production Engineering Show on the Navy Pier. Here, the mechanisms, instruments, and other related equipment that support machine tools will be presented by some 300 exhibitors.

Controls, machine components, and other production necessities such as coolants, tools, dies, and jigs and fixtures will be on view. Equipment for heat treating, welding, and plating, as well as for intra-plant communication, safety, materials handling, inspection, and testing will back up the show's theme, "Automation, Key to Manufacturing in the Sixties."

The third attraction for efficiency-minded management will be the 2nd International Coliseum Machinery Show at the Chicago Coliseum. Visitors there will have an opportunity to view machines and auxiliary equipment from U.S. manufacturers as well as imports from France, Italy, England, West Germany, Belgium, Japan, and Canada.

Keynote of the Coliseum show will be "Profits Through Machine Application." The exhibits will demonstrate ways of improving production economy by use of modern machines and machine accessories.

Equipment makers will be putting their best feet forward at the three Chicago shows, giving metalworking managers a chance to see and compare. As an aid to show visitors, and to other readers who won't be attending the Chicago shows, Tooling & Production is previewing, editorially, some of the equipment to be demonstrated there. These previews are keyed with Inform-A-Gram numbers to facilitate reader inquiries. The following pages of show news in this issue will be supplemented by many more in September's Tooling & Production.

. . . Grayson M. Stickell suggests various ways.

Areas of Cost Reduction

Increased capacity of a new model may greatly reduce unit costs.

With modern automatic controls, the production pace is set by the machine, not by the operator. The result is more *sustained* output per hour.

Numerical controls can save hours in setup time, improve accuracy, and reduce scrap.

Successive operations which now require several machines may be done on one new machine.

Automatic devices for loading and unloading may eliminate or greatly reduce hand operations.

Work now done on one type of machine may perhaps be done more economically on a quite different type.

Instead of roughing on one machine and finishing on another, the whole job may be done on one new machine with the requisite accuracy.

New processes, such as hydro-spin and hydro-form, may open up cost-reducing possibilities.

Tracer controls, used on appropriate types of work, insure repetitive accuracy. This eliminates gaging operations, and cuts scrap.

Today's new machines allow parts such as missile components to be hardened before machining instead of after, eliminating a finishing operation.

Precision forgings and castings can be used close to final dimensions on the new machine tools. The result is less metal to be removed, reduced floor-to-floor time.

New holding and chucking devices save operator time, improve accuracy and finish.

Assured accuracy cuts costs. For example, on a government contract the sustained accuracy of today's machines may reduce inspection required from 100% to one in ten parts or better.

Automatic control of surface speed per minute, available with new machines, may eliminate a subsequent grinding operation.

With new machines, maintenance costs go down.

Experimenting with new materials on old machines may prove costly.

Suppose the customer asks, "Have you the type of equipment to do this job?" If you have new machines you can answer "yes" and cut the cost of getting business.

end

Show Facts

Registration — Rapid registration cards for each of the three shows can be filled out in advance and brought to the registration desks to speed up entry.

A single fee of $3, payable on arrival, covers both the Machine Tool Exposition-1960 and the Production Engineering Show.

Fee is not necessary with rapid registration card for the Coliseum Machinery Show; without card, fee is $1. Admission is free if visitor has registration badge for other shows.

Follow-Up — An Inquiry Time Saver Plate makes it easy to request data from exhibitors at the Machine Tool Exposition-1960 and the Production Engineering Show. The plastic, charge-type plate containing your name and address is given to the exhibitor, who uses it to imprint mailing labels. All show literature will be sent to visitors' offices or plants. Inquiry Time Saver Plates must be requested in advance.

Information — Cards for rapid registration, inquiry plates, and general information for the Machine Tool Exposition-1960 and the Production Engineering Show are available from Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N. Y.

Information and rapid registration cards for the Coliseum Machinery Show can be obtained from A. Byron Perkins, president, 2216 S. Hill St., Los Angeles 7, Calif.

Machine Tool Exposition-1960
Chicago's International Amphitheatre
43rd and Halsted Sts.
Sept. 6-16, 10 a.m. to 5:30 p.m.

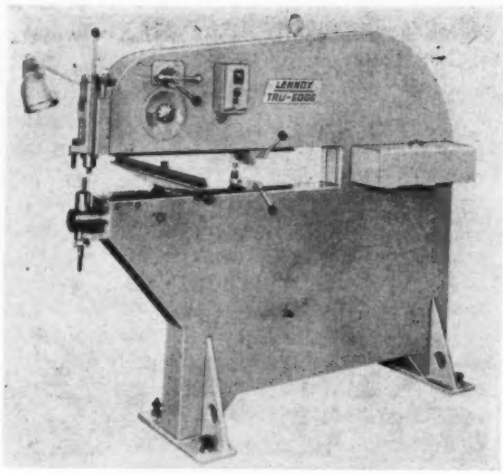
Production Engineering Show
Chicago's Navy Pier
Grand Ave. and Lake Michigan
Sept. 6-16, 1 p.m. to 10 p.m.

2nd International Coliseum Machinery Show
Chicago's Coliseum
1513 S. Wabash Ave.
Sept. 7-15, 1 p.m. to 10 p.m.

All three shows are closed Sunday, September 11.

Metal Shearing Unit

Shearing, piercing, and forming is done on the new Model TE-250 Metlmastr, to be exhibited by Lennox Tool & Machine Builders at Booth 127, Coliseum Machinery Show. It has a simplified stroke adjustment with positive stroke scale. The new unit's maximum edge-cutting capacity is 1 ga in mild steel and 5 ga in stainless. For literature, Circle No. S1.



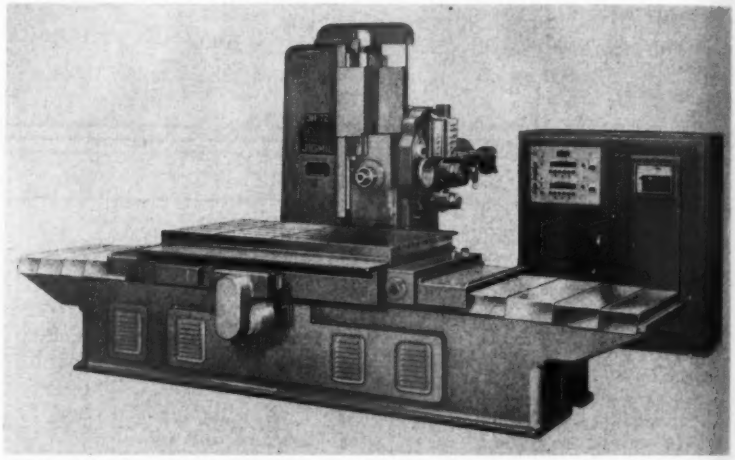
Chucks, Fixtures Galore

Teams of chucks and turning fixtures, including the new Adjust-Tru aluminum body chucks that provide a 40% weight saving plus gibbed keyways to take up wear, will be featured in the Buck Tool Co. Booth 224, Production Engineering Show. In addition, two types of jaw turning fixtures — serrated master and American Standard tongue and cross key — will be shown. These duplicate the jaws of Buck power chucks. They are used in the tool room to hold top jaws for machining or grinding after hardening. For literature on these, Circle No. S4.

Tube Flarer

Included in the Parker-Hannifin Corp. exhibit at the Machine Tool Exposition will be the new double lap tube flaring machine, which is pneumatically operated and forms ferrous and non-ferrous tubing. Punches are available for the J.I.C. standard 37° or the 45° flare. For a technical bulletin on it, Circle No. S2.

Improved Jigmils, Controls



Simplified controls, greater accuracy, and increased range for precision boring, milling, and drilling are incorporated into the new H Series Jigmils. They'll be demonstrated with Diatrol direct-dial dimensioning system and with the Tapac point-to-point measuring, positioning, and cycling system by DeVlieg Machine Co. in Booth 431 of the Machine Tool Exposition. For details, Circle No. S5.

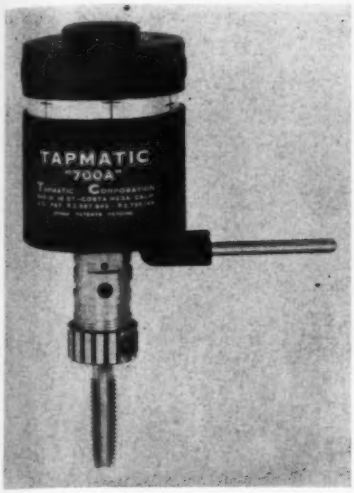
Multiple Drilling Unit

The speed, efficiency, and economy of multiple drilling and tapping will be demonstrated in Booth 321 at the Production Engineering Show by Commander Manufacturing Co. New will be Model A Multi-Angle drill unit, a self-actuating unit which may be adapted to a variety of power sources. Its built-in feed and return air cylinder has a full 4" power stroke, and any stroke length to capacity may be pre-selected. The small size (1½" dia) and long stroke of the Model A permits quick setups to handle many angle or special drilling jobs. For details on Model A, Circle Inform-A-Gram No. S3.

Titanium Carbide and Pre-Honed Inserts

Vascoloy-Ramet Corp. will feature the new VR-65 titanium carbide and pre-honed throw-away inserts at Booth 124 at the Production Engineering Show. VR-65 is designed to machine steel at elevated speeds. For details on both, Circle Inform-A-Gram No. S6.

'Floating Action' Tapping Attachment

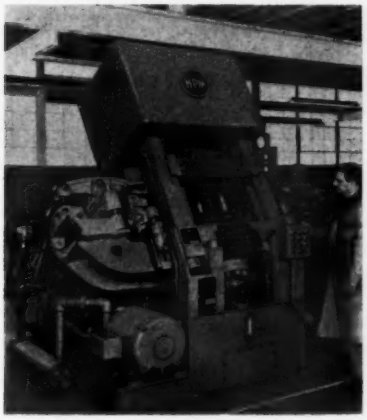


The new 700A tapping attachment that features a free axial floating drive spindle which permits taps to determine their own lead for advancing and retracting during the tapping cycle will be announced at the Production Engineering Show by Tapmatic Corp. No human or mechanical lead pressure is required, so the "lead error" often obtained with conventional friction drive attachments is eliminated. Torque adjustments are quickly made by simply turning the knurled cap at the top. Correct graduations for each size tap are clearly visible. For details, stop at the booth, or Circle Inform-A-Gram No. S7.

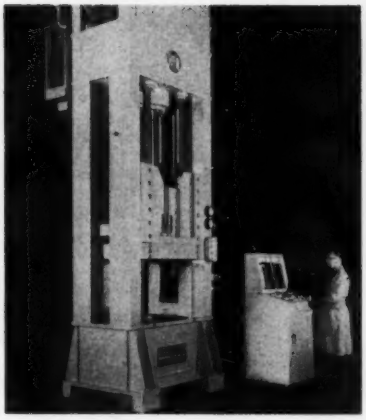
Throw-away Inserts

New Kendex Dial-A-Breaker tooling with attached, adjustable chip breakers permit wide-range chip control with standard triangular and square throw-away inserts. They'll be on exhibit along with Kennametal Inc.'s new milling cutters with throw-away inserts. The cutters use standard ¾" square carbide inserts with eight indexable cutting edges to eliminate grinding and resetting of blades. Visit Booth 1500, Machine Tool Exposition, or Booth 111, Production Engineering Show, or Circle Inform-A-Gram No. S8.

120 Strokes/Min Press

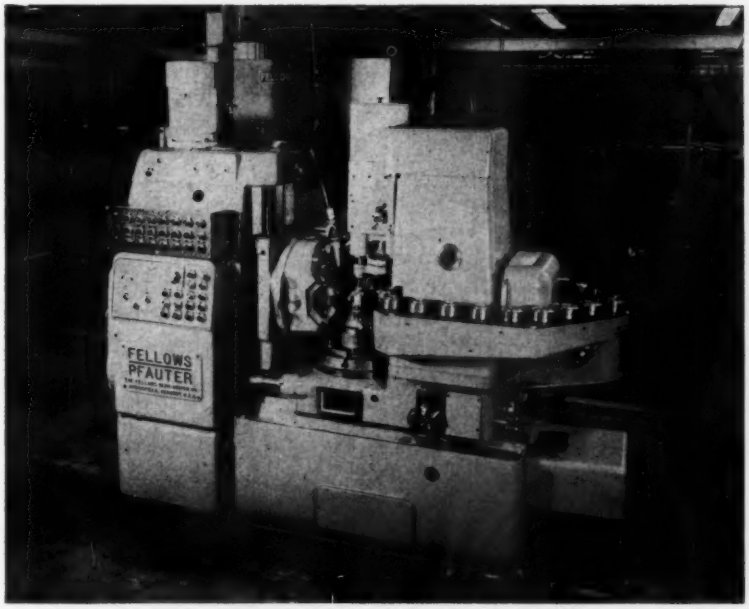


Up to 120 strokes/min are made on this special, fully hydraulic triple-action blanking press. It produces smooth edge parts without any shaving operation and operates with automatic roll feed or strip stock. See it at The Hydraulic Press Mfg. Co.'s Booth 1011, Machine Tool Exposition, or Circle No. S9 for details.



HPM'S 200-ton blankholder press, also to be shown, has complete electronic servo controls for infinite adjustment, at the operating console, of ram speed, daylight, stroke, and programming of speed changes at predetermined positions. Optical tape or punched card control is a feature. Details are available; Circle No. S10.

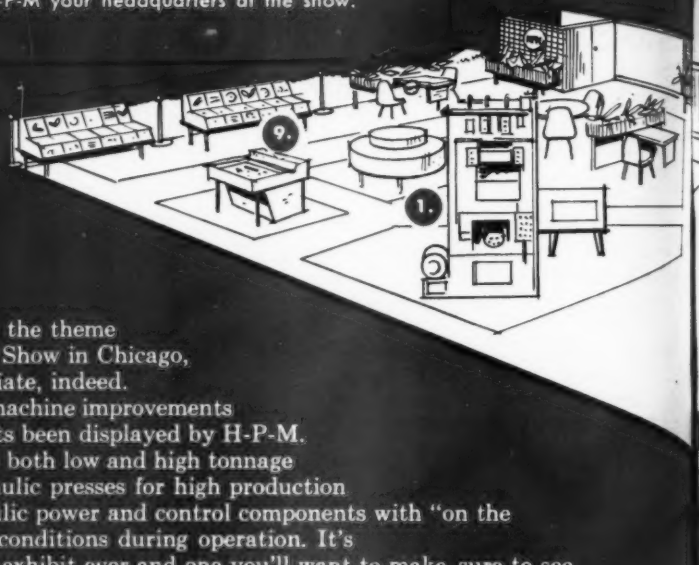
Gear Making Equipment



The new Fellows-Pfauter hobbing machine, equipped for automatic loading and unloading, is part of a complete line of equipment for production and inspection of gears to be exhibited in Booth 929, Machine Tool Exposition, by The Fellows Gear Shaper Co. For information, Circle Inform-A-Gram No. S11.

SEE YOU AT THE SHOW

This artist's sketch of the H-P-M display illustrates the depth and scope of our 1960 NMTBA Show exhibit. It's our biggest ever — packed with new machines and exciting modifications of standard equipment you'll want to see. Room for relaxing, too, when the feet give out. Make H-P-M your headquarters at the show.



Production efficiency will be the theme of the H-P-M exhibit at the Show in Chicago, Sept. 6-16. And it's appropriate, indeed. Never before have so many machine improvements or so many new developments been displayed by H-P-M. The items on exhibit include both low and high tonnage press equipment; new hydraulic presses for high production stamping operations; hydraulic power and control components with "on the spot" recording of pressure conditions during operation. It's the biggest and best H-P-M exhibit ever and one you'll want to make sure to see.

BOOTH 1011

A NEW APPROACH TO "SMOOTH EDGE" BLANKING

1. Parts ready for assembly direct from the press . . . made on this special, fully hydraulic triple action press, equipped with special die. Speeds up to 120 strokes per minute. See it run with automatic roll feed! Changes in thickness and type of metal made without press adjustment. Push your way through the crowd and *watch it work — at the show.*

2. **NEW ELECTRONIC CONTROLS FOR HEAVY DUTY PRESSES.** Dynamic new press control developments adapt standard H-P-M metal-working presses for new speed, efficiency and control. A 200-ton blankholder press adaptable for a wide range of jobs will be displayed. *Push-button efficiency — at the show.*

3. **5-TONS OF AUTOMATED VERSATILITY.** The H-P-M C-Press offers basic automation within the budget of all size shops. The press and table combination puts high speed automation in your shop for countless production needs. *See it work — at the show.*

4. **10-TON SERVO CONTROLLED C-PRESS.** With near magic simplicity, the press ram duplicates every motion of the operating lever. Even force on work may be operator controlled; every motion of the lever corresponds exactly to speed and tonnage requirements. *Try it yourself — at the show.*

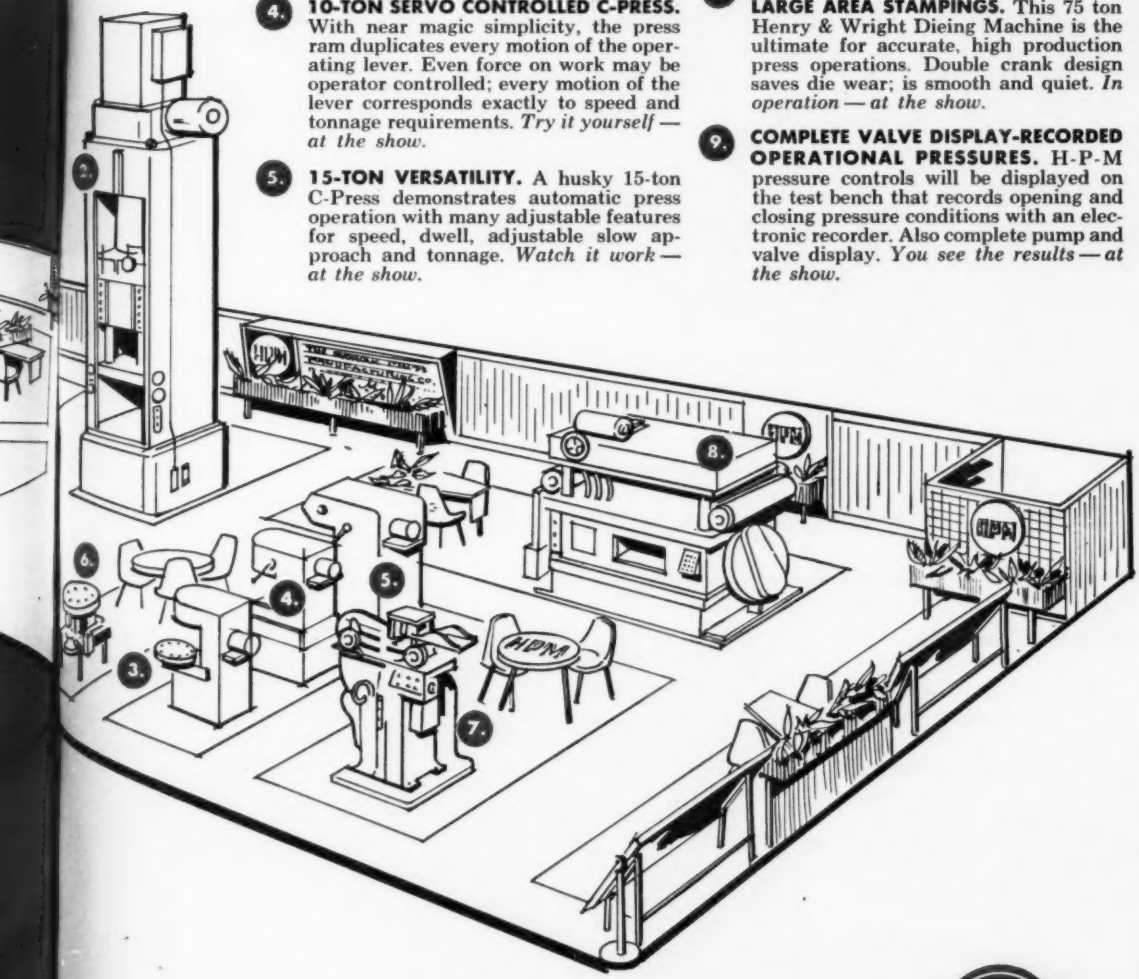
5. **15-TON VERSATILITY.** A husky 15-ton C-Press demonstrates automatic press operation with many adjustable features for speed, dwell, adjustable slow approach and tonnage. *Watch it work — at the show.*

6. **OPERATIONAL INDEX TABLE CUTAWAY.** See for yourself the features and the functional control of the H-P-M index table. Cutaway viewing permits examination of all moving parts. *For your approval — at the show.*

7. **HIGH PRODUCTION HENRY & WRIGHT, 25-TON.** A perfect demonstration of low to medium tonnage productivity with the versatile, high production Henry & Wright Dieing Machine. Fully equipped; a manufacturing man's dream for top quality production. *See it go — at the show.*

8. **DOUBLE CRANK PRODUCTIVITY FOR LARGE AREA STAMPINGS.** This 75 ton Henry & Wright Dieing Machine is the ultimate for accurate, high production press operations. Double crank design saves die wear; is smooth and quiet. *In operation — at the show.*

9. **COMPLETE VALVE DISPLAY-RECORDED OPERATIONAL PRESSURES.** H-P-M pressure controls will be displayed on the test bench that records opening and closing pressure conditions with an electronic recorder. Also complete pump and valve display. *You see the results — at the show.*



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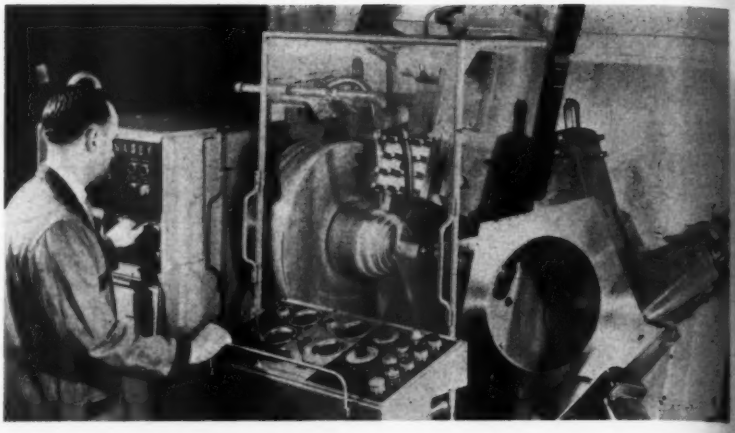
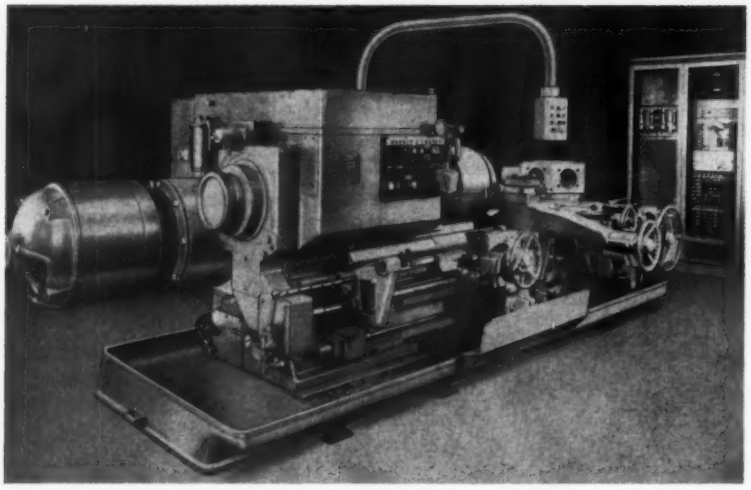
H73

CIRCLE INFORM-A-GRAM KEY NO. 65

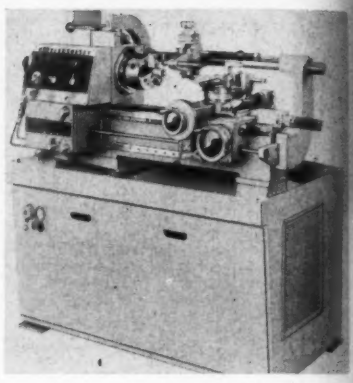
Turret Lathe Control With and Without Tape

An electronic tapeless memory system on the new 25″ swing numerically controlled Servofeed turret lathe can store and recall operational commands of any machining setup. The operator simply touches a button following an acceptable cut, and feed, speed, start of cut and other factors are recorded by the machine so they can be used to control operations on succeeding pieces. Warner & Swasey Co. will show this machine in its booth at the Machine Tool Exposition. For information, Circle No. S12.





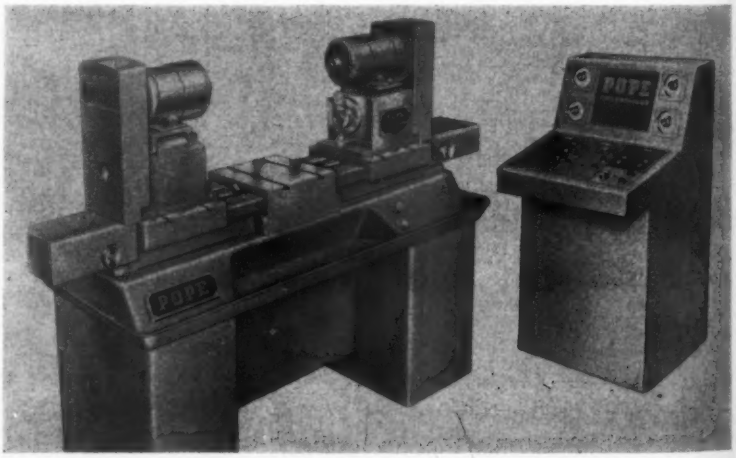
New Servo-Tape 2-axis numerical contour control attachments for the carriage and saddle aprons of 4-A turret lathes will also be on display. The tape system for contouring doesn't prevent use of the machine for conventional work. For details see W&S or Circle S14.



A flat-type 8-station cross sliding turret with tangential T slots for mounting tooling is a feature of the new precision chucking turret lathe to be exhibited by Warner & Swasey. It's for medium to small size parts in optical and electronics work. Circle No. S15.

Programmed Boring

This new machine bores holes simultaneously from both directions to within 0.000020″ roundness. Its two moving heads ensure fast production and the new Pope Electric Programmer (right) provides fast setup and flexibility of operations. The Programmer controls head motion, rapid traverse, fine feed rate, coolant flow, clamping, and other functions. Look for this unit at Pope Machinery Corp.'s exhibit at the Machine Tool Exposition. For more information, Circle Inform-A-Gram No. S13.



UNIPUNCH SUPERMARKET

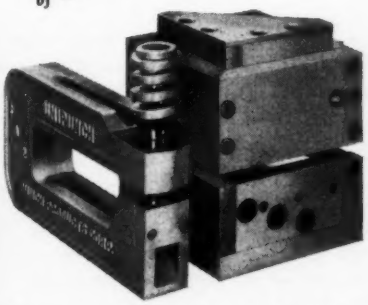
Look for this stamp on Packing Slips as proof of UNIPUNCH CUSTOMER SERVICE.

Experienced UNIPUNCH Shoppers fill Your Unitized Tooling Orders with OFF-THE-SHELF DELIVERY

Unipunch Order, Stock and Shipping Departments are geared for *supermarket service* on standard Units, Punches, Dies, Holders and other Interchangeable Parts. Maintenance of high stock levels insure immediate delivery.

"Specials" are expedited through Engineering and Production Departments for fastest possible shipment.

SERVICE is the "buy" word at Punch Products.



Complete range of Unitized Hole Punching and Notching Units available in standard shut heights for multiple combinations for perforating and notching material up to ½" thick. These Unipunch Units are self-contained with automatic alignment of punch and die. Nothing is attached to press ram. Setups are made outside press with practically no press "downtime."

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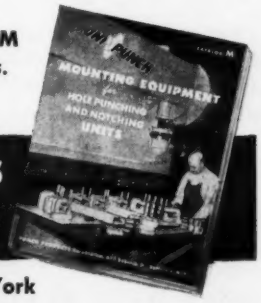
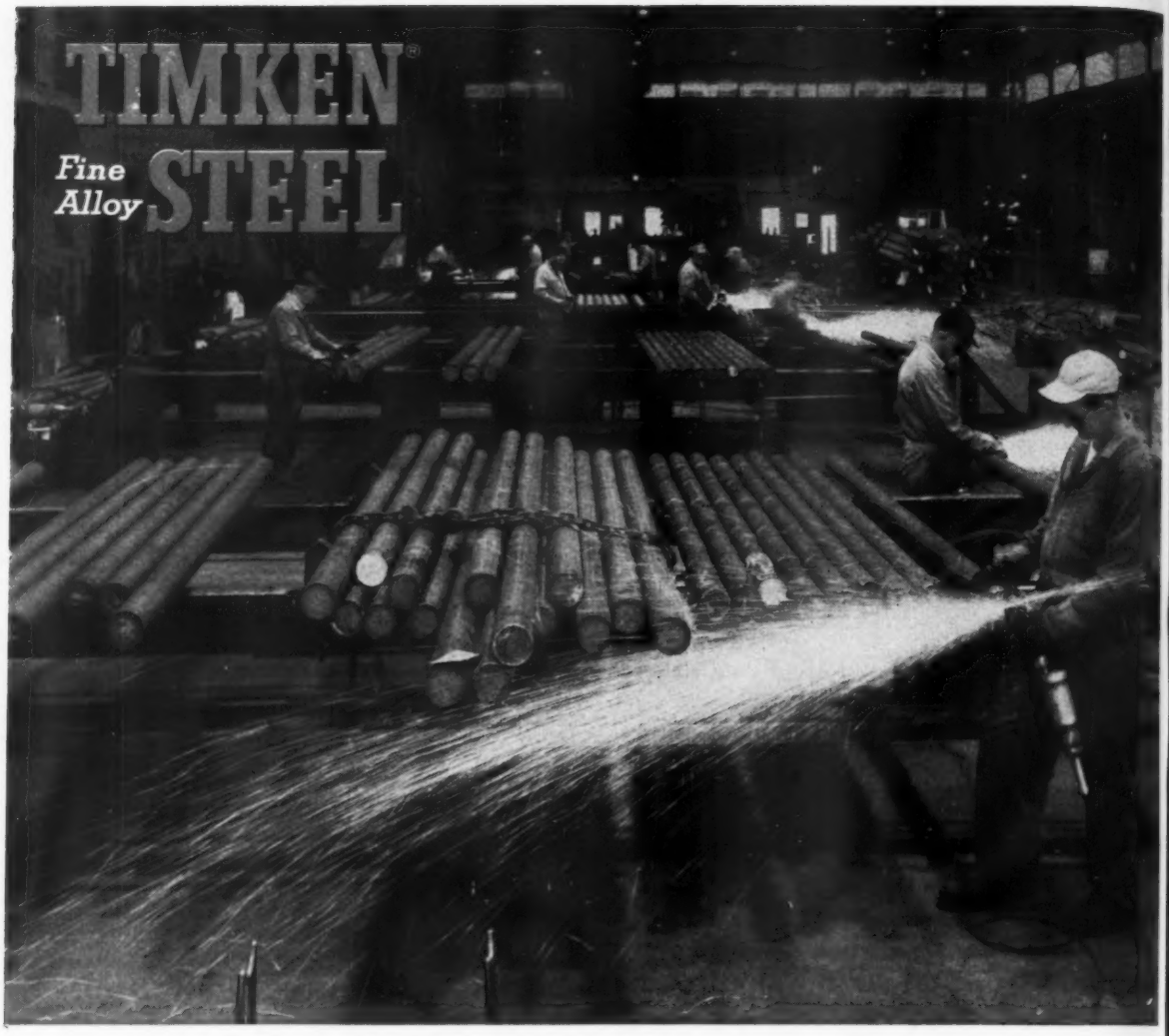


PUNCH PRODUCTS Corporation

374 Babcock Street, Buffalo 6, New York

CIRCLE INFORM-A-GRAM KEY NO. 67



"Toughest" inspection in the steel business assures you utmost uniformity in Timken® forging steels

You can always be sure your forged products made from Timken® steel forging bars will have uniform quality. One big reason is the rigid, 100% Final Inspection we give every bar. Examination is so thorough that our Inspection Department is known as the toughest in the steel business.

You save money, too, because of the uniform quality of Timken steel. It is remarkably uniform in structure, chemistry and dimension from heat to heat, bar to bar, order to order. And because we handle each order individually, we can target our procedures to *your* end-use requirements. You don't have to interrupt your operations to make costly equipment adjustments.

Important to our operations is a new Metallurgical Research Center, one of industry's most modern. Its facilities range all the way from an experimental melting laboratory to one of the industry's finest technical libraries. It is designed not only to improve our own products but also to solve customer problems—your problems.

When you buy Timken steel you get: 1) *Quality that's uniform from heat to heat, bar to bar, order to order.* 2) *Service from the experts in specialty steels.* 3) *Over 40 years experience in solving tough steel problems.*

For the most from your modern forging operations, specify Timken steel forging bars. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable: "TIMROSCO". *Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits.*

TIMKEN ALLOY STEEL AND SEAMLESS STEEL TUBING ARE AVAILABLE FROM STEEL SERVICE CENTERS IN 44 CITIES IN THE UNITED STATES

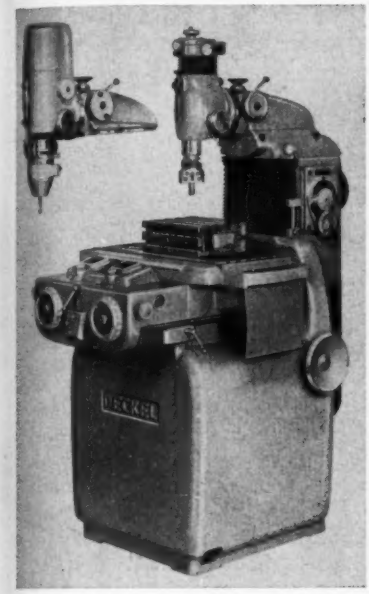
CIRCLE INFORM-A-GRAM KEY NO. 68

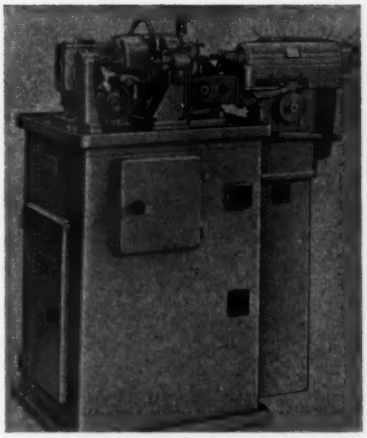
Parade of Precision Machines

A Deckel LK machine with interchangeable heads for jig boring and jig grinding is one of the variety of other precision machine tools to be displayed by Cosa Corp. at Booth 653, Coliseum Machinery Show. Also on display will be the Escomatic D4 for automatic precision form turning and end operations on small parts. The Koepfer gear hobber 170, a fully automatic unit with magazine feed; the Schenk R06 small parts balancing machine; and two Studer universal and cylindrical grinders fill out the booth.

In Booth 117, Cosa will demonstrate the Trumpf CN63, a universal sheet metal working machine with copy-nibbling attachment and the Trumpf TAS42 for curve cutting and nibbling. For details on any of these machines, Circle Inform-A-Gram No. S17.

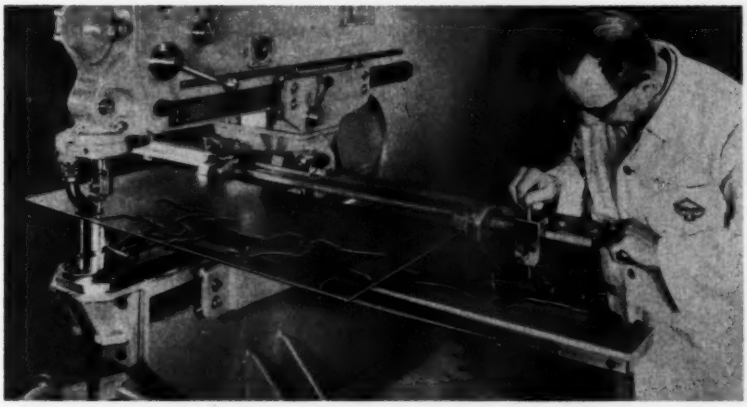
Deckel LK with Interchangeable Heads for Jig Boring & Jig Grinding.



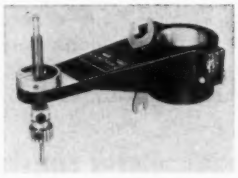


Escomatic D-4 Coil-Fed Automatic Form-Turning Machine.

Trumpf CN 63 Universal Sheet-Metal Working Machine.



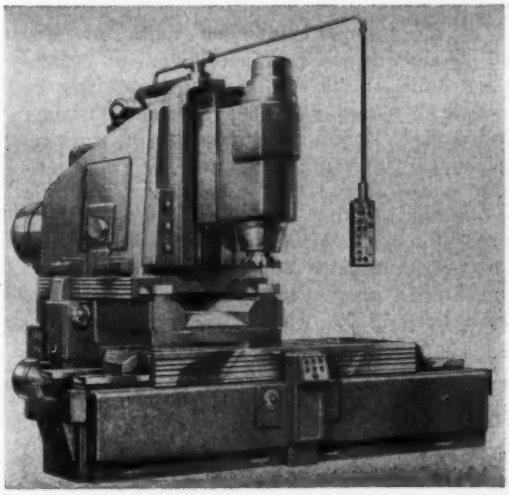
New Aids for Tapping



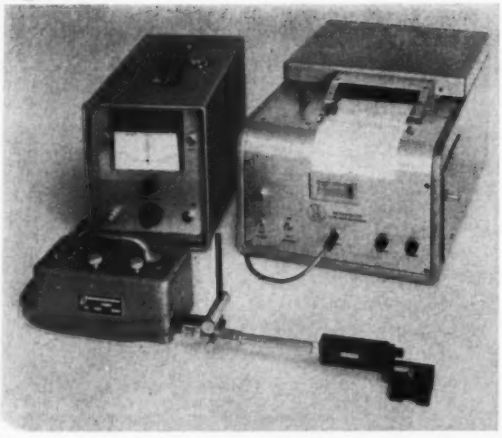
Precision tapped holes are produced with the Auto-Tap lead screw tapping attachment, to be shown by Ettco Tool & Machine Co., Inc., at Booth 247 of the Production Engineering Show. It's attachable to any round column drill press and can be used with any reversing type tapping head. New models in the Ettco Knuckle-Head line of universal ball joint adjustable spindle drilling and tapping heads will also be exhibited. For data, Circle No. S16.

Machine Tool Medley

This Model 3006 Mil-waukee-Mil vertical bed type milling machine has the capacity of a large bed type plus the versatility of the knee type. A 50-hp motor powers the spindle through 24 speeds ranging from 15 to 1500 rpm. Other machines to be exhibited at the Machine Tool Exposition by Kearney & Trecker Corp. include the numerically controlled Milwaukee-Matics and a variety of knee type and bed type milling machines. Visit Booth 1008, or Circle Inform-A-Gram No. S18.

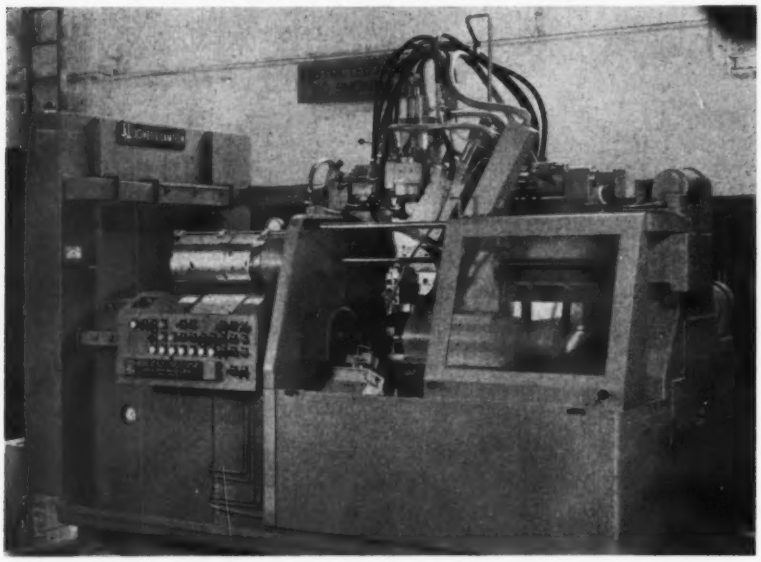


Record Surface Roughness



The Microcorder is an electro-mechanical instrument which provides a permanent magnified chart of the roughness profile of a surface. It is particularly important for studying surfaces which are pitted, porous, have flaws, scratches, or other irregularities, and will be demonstrated at Booths 418, 420, and 422 of the Production Engineering Show by Micrometrical Manufacturing Co. For details on it, Circle Inform-A-Gram No. S19.

Lathes, Form Grinders Make Bow At Show

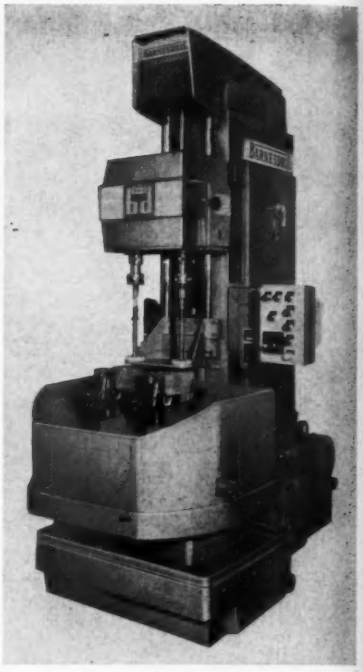


Three different models of the new family of Model 30 single spindle automatic turning and tracing lathes, as well as form grinding units, tape controlled positioning tables, boring machines, and gun drilling equipment will be included in the Jones & Lamson Co. exhibit in Booth 839, Machine Tool Exposition.

One of the Model 30 machines will be set up as a multiple slide single spindle automatic, machining a production run of crankshafts. Another (pictured) will be used as a 60° automatic tracing lathe for high production work on steering knuckles. The third machine will demonstrate multiple tooling of 2-dimensional tracing on a series of different sized gear blanks. For information on these units, Circle Inform-A-Gram No. S20.

Additional Show Products are described on pages 62, 63, 66, 69, 75, 78, and 82 of this issue.

New Honing Machines



Three new honing machines, as well as a 30,000 lb thrust mechanical unit for drilling, and an immersed drum filter for central systems, will be introduced at Booth 152, Machine Tool Exposition by the Barnes Drill Co. One of the units, a single spindle Model 244 honing machine (pictured), will demonstrate the honing of bores up to 4" dia. This unit can be augmented with a wide variety of fixtures and tables, and can be equipped with automatic Plugmatic sizing, electric hone expansion, and automatic compensation for stone wear. For more information, Circle Inform-A-Gram No. S21.

Automatic Metal Finishing

Building block concept of metal finishing (brushing) machines will be demonstrated by an automatic unit to be shown by Osborn Mfg. Co. at the Production Engineering Show. Its rotary index table has six work spindles and carries and rotates parts beneath the two single spindle finishing heads mounted around the table. Automatic load, unload, and turn-over mechanisms handle the parts between the two heads. For details, Circle Inform-A-Gram No. S22.

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Take your choice of dependable Danly SC crankshaft presses in capacities from 50 to 300 tons...bed areas to 72″ x 60″...with strokes to 16″...constant or variable speeds to 90 SPM... with non-geared, single or double-geared drives...equipped for manual or automatic feed.

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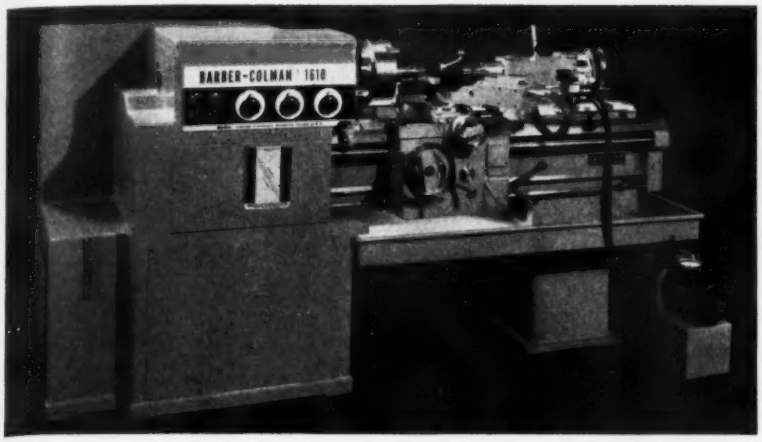
CIRCLE INFORM-A-GRAM KEY NO. 71

A New Concept in Lathes

New Barber-Colman "specialist" lathe features 16" and 20" swing and infinitely variable feeds and speeds



MODERN MACHINE TOOLS MMT-PE PRODUCTION EFFICIENCY

See the 1610 with tracer at 1960 Machine Tool Exposition . . . Booth No. 923.

Barber-Colman's new 1610 lathe with 16″ or 20″ swing and 6½ hp motor is a "specialist" lathe for turning, facing, and boring—and there's a place for it in every lathe department. Setup time is reduced, and production is increased 100% or more on many jobs. You might hesitate, at first, before buying a precision lathe that cannot be used for threading. But greater speed and feed control for those who want productivity and precision at a saving produces several practical benefits.

Low initial cost—You can purchase a Barber-Colman 1610 (*equipped with tracer attachment*) for approximately the same price as a toolroom lathe of the same rated capacity and quality. If other lathes are available for threading, this lathe is the most economical one to use for high-speed turning, facing, and boring. This lathe is also available as a 1610-13 for high-speed machining of parts which require 20″ swing over the ways.

Why put low-speed work on a high-speed lathe?

Since threading normally requires slow speeds, older toolroom lathes can be used economically for cutting threads. Put your turning, facing, and boring operations on this lathe to take full advantage of its high speeds (up to 2000 rpm) and infinitely variable feeds and speeds.

Control of feeds and speeds—Spindle speed of this 1610 is instantly, independently, and infinitely variable to any speed in its available range. Even during the cut, the operator can change spindle speeds just by turning a dial on the headstock. No time is lost shifting gears or stopping the machine.

Power feed to both carriage and cross slide is infinitely variable, also. There are no gears to shift—just a simple dial on the headstock. Feed per revolution can be varied from .0001″ to .488″, depending upon the speed range of the machine.

On high stock removal jobs, you can rough to within a few thousandths of final size, then take a quick finishing cut. The ease with which Class B operators can control feeds and speeds assures finer, more uniform finish, maximum machine utilization, and economical tool life on every job.

Simple tracer setups—Experience proves that less than 20 minutes is needed to set up the Barber-Colman hydraulic tracer. This is possible because the stylus can be positioned independently of the tool slide—the valve responds to pressure from any direction. Front mounting makes it easy to change over—chips don't pile up on the template. The lathe can be operated manually without removing the tracer, or the attachment can be replaced with the regular compound in less than ten minutes. Tracer operates from 0° to 90° with the work axis, and controls the machine consistently within .001″ on diameter or length.

Quality, versatility and economy

Convenient controls—particularly the five-position, turret-type longitudinal feed stop—simplify operation even at peak production efficiency. This feed stop is particularly advantageous for multiple-diameter turning because it eliminates scale readings and reduces skill requirements. It is one of many standard features on the 1610—simple, easy to use, and trouble-free.

Obviously, this is another Barber-Colman quality machine that will turn out toolroom quality work. Phone your Barber-Colman representative or write us for descriptive literature and complete specifications. Ask for Bulletin No. 9061-1.

Barber-Colman Company

BARBER COLMAN ®

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CIRCLE INFORM-A-GRAM KEY NO. 73

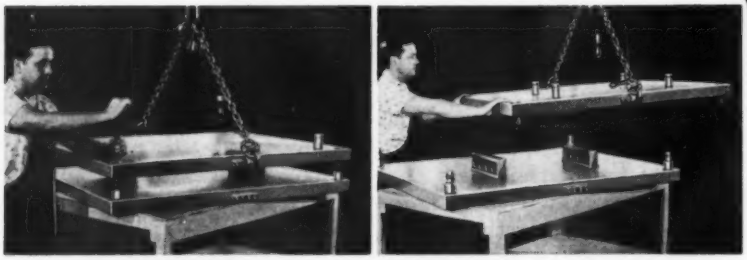
THIS IS ALL YOU NEED TO PART A SUPERIOR DIE SET EQUIPPED WITH *Removable Cap* GUIDE PINS

A *Flick* OF AN ALLEN WRENCH

loosens the socket head screws—the removable caps are pushed up through the bushings . . . then the punch holder virtually floats on the guide pins. That makes it a simple matter to lift the punch holder off the die shoe. Tilting or uneven lifting is not a factor when removable cap pins are used. THERE'S ABSOLUTELY NO TROUBLESOME BINDING IN PARTING DIES.

No Die Set Smash-Ups
Should foreign matter cause pin and bushing seizure, the socket screw pulls out of retaining washer . . . then the matching taper of pin and cap act as guide to prevent costly die damage.

WRITE FOR 24 PAGE CATALOG



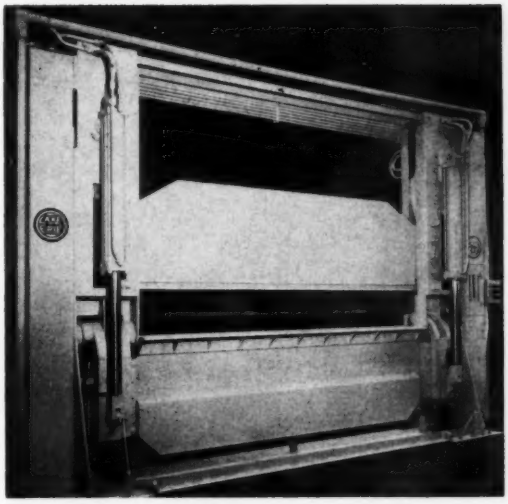
One man parts large die set in a few minutes with Superior Removable Cap Guide Pins

NOW ON ALL SUPERIOR DIE SETS IN DIAMETERS FROM 1½" UPWARD AT NO ADDITIONAL COST.

SUPERIOR
STEEL PRODUCTS CORP.
2754 SO. 19TH STREET MILWAUKEE, WISCONSIN
AND CHESHIRE, CONNECTICUT

CIRCLE INFORM-A-GRAM KEY NO. 74

Bending Without Dies

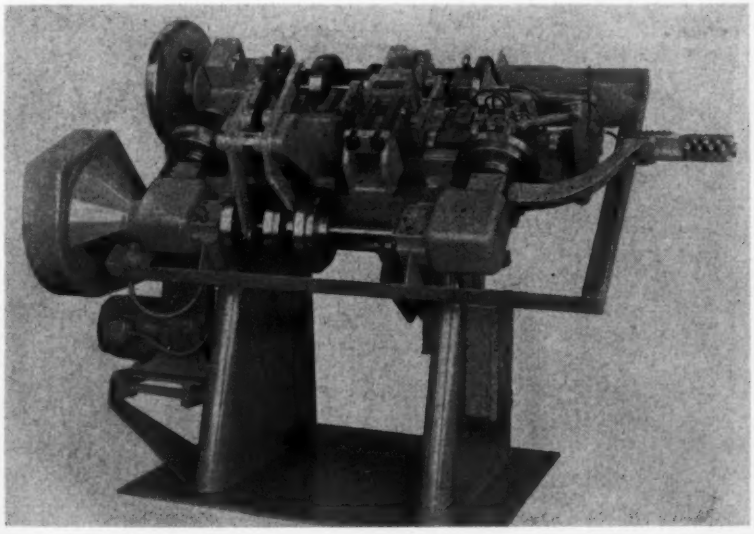


The Form-All double apron bending brake is used without dies and produces intricate one-piece shapes. Front and rear wings can operate independently, allowing sharp angular bends on or at the end of a radius, and full 360° bends. Visit Lake Erie Machinery Corp.'s Booth 542 at the Machine Tool Exposition, or Circle Inform-A-Gram No. S23 for details.

37 Machines In A Booth

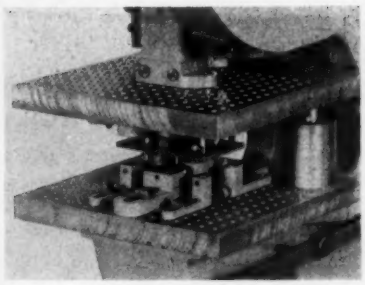
Visitors to Booth 1034, Machine Tool Exposition, will see 37 Cincinnati Milling Machine Co. machines in operation. Units for grinding, broaching, milling, and die sinking will be there, along with machines for hydroforming, electrical discharge machining, and gaging. Acramatic numerical control will be another feature of the exhibit.

Forms At Any Angle

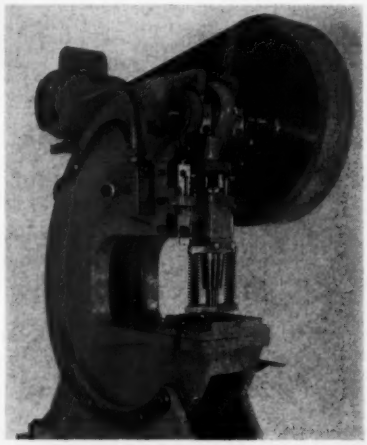


This new inclinable ribbon-wire forming machine handles ribbon metal and wire stock and can be operated from a 0° horizontal position to a 90° vertical position. It forms and ejects 75-300 pcs/min without restriction due to its operating angle and can be used with automatic receiving equipment including conveyor, rotary table, and stacking units. Other machines to be introduced by The Baird Machine Co. at the Machine Tool Exposition include an 8-spindle high production automatic chucker, a vertical continuous lathe, and a transfer press. For details, Circle Inform-A-Gram No. S24.

New O.B.I. Press, Punch and Die Set



A new Di-Acro adjustable punch and die which can be used in any power press for multiple hole punching in sheet materials, and a



new 5-ton O.B.I. punch press, will be demonstrated by O'Neil-Irwin Mfg. Co., Booths 259-65, Production Engineering Show. S25.

Each die holder of the set has a self-cleaning slug chute, eliminating the need to bore holes in bolster plate. The press has a 12" throat and can do either single or multiple hole punching. Also to be shown for the first time will be a sheet layout machine and a power operated leaf-type brake. For information, Circle Inform-A-Gram No. S26.

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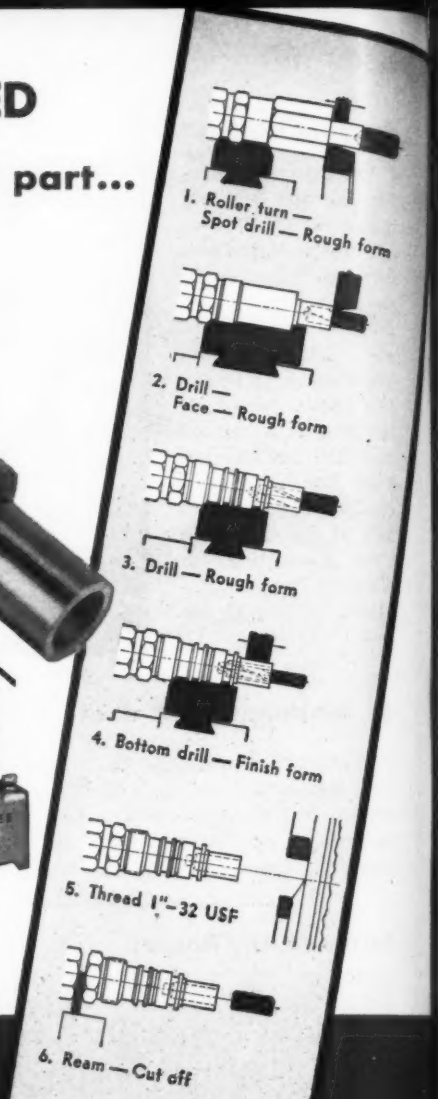
GREENLEE AUTOMATICS SPEED PRODUCTION of precision pump part...

The part is the injector cylinder of the Greenlee No. 798 High-Pressure Portable Power Pump manufactured by Greenlee Tool Co., a division of Greenlee Bros. & Co. Since the pump is capable of developing pressures up to 10,000 psi, extreme precision is required in producing the cylinder. It is machined from 1-inch hexagon 4150 chromium-molybdenum steel at a gross production rate of 48 pieces per hour. Sequence of the 13 operations performed is shown at right. Your Greenlee representative will be glad to help solve your precision part problems... just send us a print.


1. Roller turn — Spot drill — Rough form
2. Drill — Face — Rough form
3. Drill — Rough form
4. Bottom drill — Finish form
5. Thread 1"–32 USF
6. Ream — Cut off

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6	19	32	73	92	973	1021	1063	1103	1143	1201	
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12	25	40	82	813	991	1032	1081	1122	1163	1221	
13	26	53	86	851	992	1041	1082	1131	1181	1222	
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C7	C20	C33	C46	C59	P9	P22	P35	P48	P61	S13	S26
C8	C21	C34	C47	C60	P10	P23	P36	P49	S1	S14	S27
C9	C22	C35	C48	C61	P11	P24	P37	P50	S2	S15	S28
C10	C23	C36	C49	C62	P12	P25	P38	P51	S3	S16	S29
C11	C24	C37	C50	C63	P13	P26	P39	P52	S4	S17	S30
C12	C25	C38	C51	P1	P14	P27	P40	P53	S5	S18	
C13	C26	C39	C52	P2	P15	P28	P41	P54	S6	S19	

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14	27	59	87	852	993	1051	1091	1132	1182	1231	

EDITORIAL ITEMS

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C3	C16	C29	C42	C55	P5	P18	P31	P44	P57	S9	S22
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C8	C21	C34	C47	C60	P10	P23	P36	P49	S1	S14	S27
C9	C22	C35	C48	C61	P11	P24	P37	P50	S2	S15	S28
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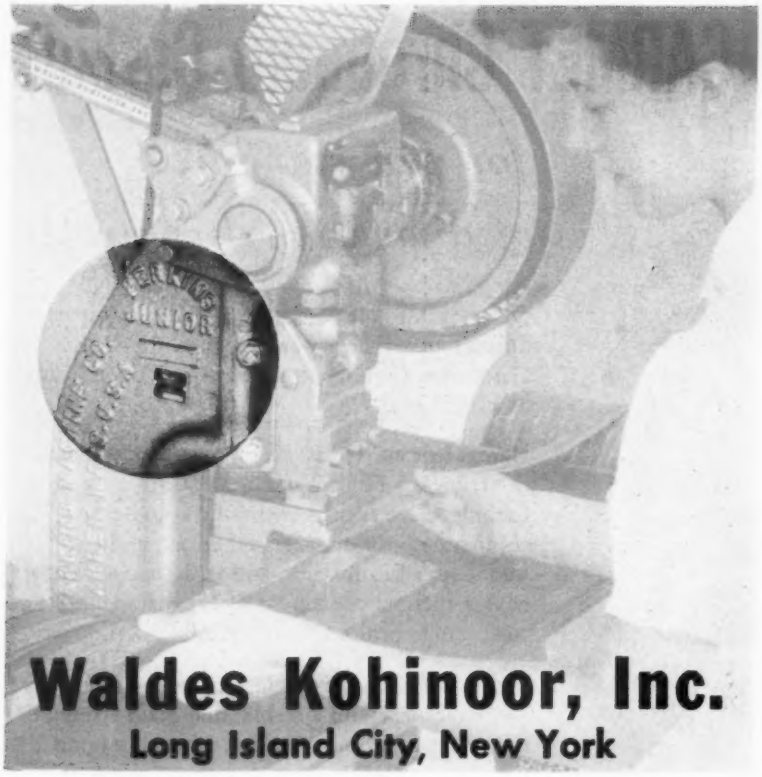

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Long Island City, New York

one of the world's largest producers of zippers and snap fasteners, hook-and-eye tapes and other garment closures for the apparel industry — also well known in the industrial field for its manufacture of Truarc retaining rings, grooving tools and other industrial fastening devices and tools — are now using over 50

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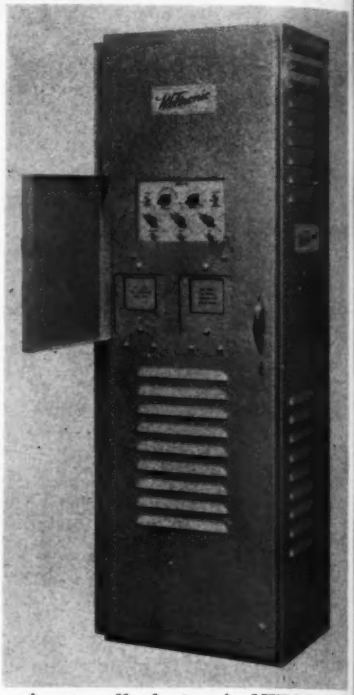

A new all-electronic NEMA N2 control, designed for the general user, will be introduced by the Weltronic Co. at the Production Engineering Show. The high-speed unit has features normally found only on special automotive type controls. Optional functions such as slope, post-heat, forge, and electronic firing of valve and contactor are available as plug-in features. For information on this product,. Circle Inform-A-Gram No. S27.

New Automatic Assembly

A standard automatic assembly machine to be demonstrated by Ferguson Machine Corp. at Booth 246-248 of the Production Engineering Show embodies the machine tool concept, whereby only special work holding devices designed to accommodate specific parts are added as one would apply special cutting tools and fixtures to a production mill or screw machine. Where a similarity of product parts and assembly methods exists only new holding devices may be necessary to set up for a change-over in production. For details on the unit, Circle Inform-A-Gram No. S28.

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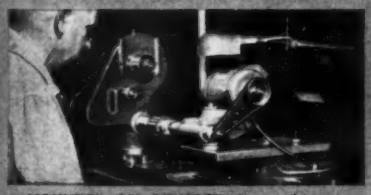

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CIRCLE INFORM-A-GRAM KEY NO. 79

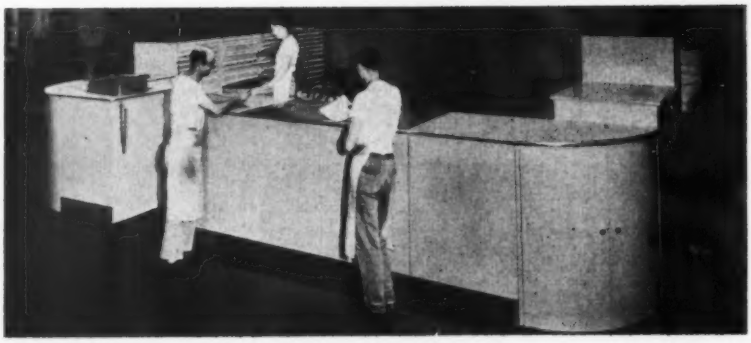
"Before," the area appears normal when compared with most plants, but disorderly when compared with the "after" shots.

Ah, Neatness!

. . . In the Tool Crib

These photos show how the tool and spare parts storage facilities of Ehrhardt Tool & Machine Co., St. Louis, were modernized.

The Vidmar modular (and interchangeable) steel cabinets are designed specifically to accommodate the sizes, shapes, and weights of industrial tools, parts, gages, and the like. Average floor space savings alone is 40-50%.



An outside-in view of the same Vidmar installation at Ehrhardt, where executives point out that many hours are now saved each shift with it. An efficient inventory control system has also resulted from it, reflecting immediate savings in the purchasing of tools and parts.

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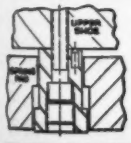

Replaces shoulder screws to strengthen junction between pad and shoe—reduce die pad failures. Large diameter for good footing, cyanide hardened for excellent wear. Load ratings from 900 to 3,000 lbs. Stocked for quick shipment. Send for catalog and quote. Dealer inquiries invited.

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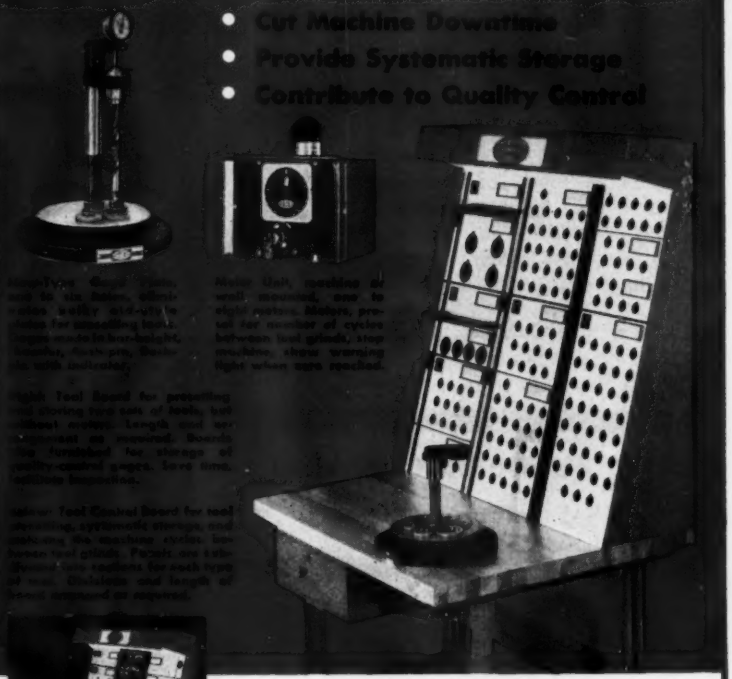
CIRCLE INFORM-A-GRAM KEY NO. 811

SEIBERT TOOL-CONTROL SYSTEMS

- Cut Machine Downtime
- Provide Systematic Storage
- Contribute to Quality Control



Seibert Tool Control Systems cut machine downtime by having preset tools immediately available for quick changes. They save workers' time by providing systematic storage for preset tools, presetting gages, and quality-control gages. In addition, they prevent excessive parts spoilage by warning the operator and stopping the machine when tool changes are required. Such a control system, engineered for the particular needs of your mass-production plant, will provide almost unbelievable savings. Ask for detailed information or for a Seibert Engineer to survey your needs.

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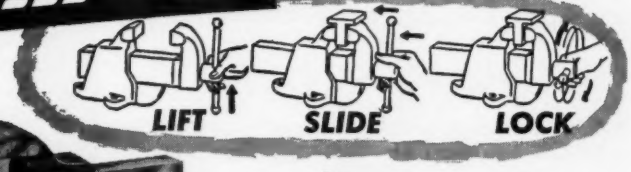

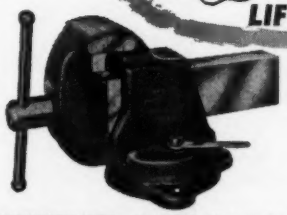

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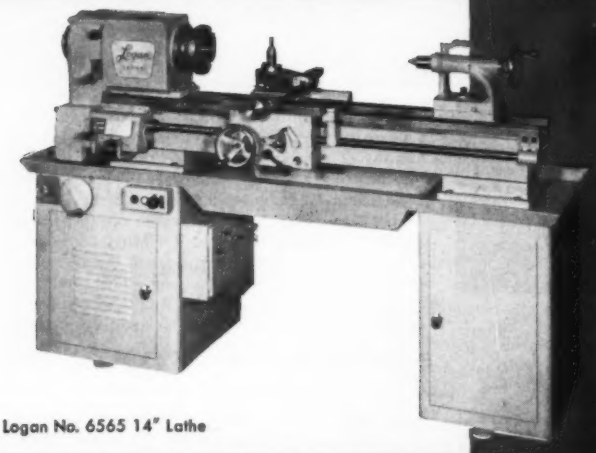
CIRCLE INFORM-A-GRAM KEY NO. 813

Tricky Air Circuits

You can drive a nail with a feather at the Westinghouse Air Brake Co., Industrial Product Div'n exhibit at Booth 301, Production Engineering Show. Air circuits will be used to drive an 8-penny nail into a solid 4" x 4" wooden block by the mere touch of a feather after maneuvering the block into any one of 20 different positions. Unique multi-position air cylinders and seven different types of directional air valves will be combined into an air circuit with safety interlocks, sequence operation, and various other types of control. Circle Inform-A-Gram No. S29.

its specifications add up to high production capacity

Logan 14" Lathe



Logan No. 6565 14" Lathe

Logan designs greater reliability and accuracy, and longer life into its lathes by a generous combination of high-capacity features. For instance—

- An oversize spindle with 1⅝" bore turns on four super-precision ball bearings with built-in preload
- A variable-speed drive lets you change speed while work is turning—without shifting belts
- A warp-free lathe bed with high, strong walls braced by oversize ribs to withstand heaviest stresses; two V-ways and two flat ways are flame-hardened and precision-ground.

There are many more reasons why this and other Logan Lathes have a greater capacity. The complete specifications tell the story. Write for them.

- Spindle speeds to 2000 rpm
- 1⅛" Levermatic collet chuck capacity
- 14⅜" swing over bed
- 9" swing over saddle cross slide
- 40" between centers

LOGAN ENGINEERING CO. Dept. M-850, 4901 Lawrence Avenue, Chicago 30, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 82

Redesigned for Centerless Lapping

Size Control Co.'s centerless lapping machine has been re-engineered and will be demonstrated at Booth 1120 of the Machine Tool Exposition. Improvements include sturdier and more convenient housing, easily adjustable rolls, easily accessible belt tightening, V-belt driven rolls that assure no vibration, and special lapping rolls for lapping carbides. Options include central oiling system and swing-away light.

Also to be demonstrated by Size Control are their Depth-Mikemaster depth micrometer, which saves time and reduces scrap caused by improper measurements, their Bore-O-Scopes, and their other gages and gage sets. For detailed information on these products, Circle Inform-A-Gram No. S30.

You'll find more Show Products in the September Tooling & Production. Watch for it!

Patent

Law Protection Against

Infringement

by Albert Woodruff Gray

What constitutes patent infringement? And, how serious is it? Citations from various court cases help answer these questions in this article by a New York lawyer and legal writer. Popular with T&P readers were Mr. Gray's "Restrictions on Patent Licenses" (Nov. '59) and "Who Owns the Invention" (Jan. '60).

CHARGES OF INFRINGEMENT of a patent covering an electric signal amplifier were met by the infringer with an argument that the units had been sold to the Federal Government, and that under such circumstances no action could be brought for infringement, but only for compensation against the United States in the Court of Claims.

Unfortunately for the infringer, in the welter of conflicting statements at the trial it appeared that at least 10 of the amplifiers had been sold to private buyers. The lower court held these sales were negligible and insufficient grounds for holding the seller an infringer. The patent owner appealed that decision, however, and the ruling of the lower court was reversed. At that time the U. S. Court of Appeals said:

"By the grant of a valid patent the owner obtains an exclusive right not only to prevent use by another . . . but likewise the making or the selling of the article in the disjunctive.

"Just as the manufacture of one machine by an infringer is sufficient to make the manufacturer liable regardless of use or sale, so one sale is sufficient. The mere manufacture of a patented article without sale is sufficient to create an infringement. And even the threat to use patented subject matter may give a right to a cause of action."[1]

The patent law provides, "Whoever without authority, makes, uses or sells any patented invention within the United States during the term of the patent therefor, infringes the patent."[2]

Repair or Reconstruction

Efforts of competitors are frequently made under the cloak of repairs, where the work is essentially a reconstruction or replacement of the patented article itself.

Action by a Michigan machine manufacturer, for example, involved 14 patents for improvements in thread cutting die heads. Each patent utilized four of these cutters simultaneously.

The heads, in combination with holders and cutters, forced the work into the die. Patents on the cutters had expired, but the patents on the combination had not, and this infringement consisted in the sale by others of these cutters for use in the patented combination.

Asserting such replacing or reconstruction to be an infringement, the court pointed out that the distinction between permissible repair and prohibited reconstruction of patented objects rests upon a determination of whether the parts so dominated the structural substance of the whole patented combination as to justify the conclusion that it has been made new.

"If it does," said the court, "there is a rebuilding or reconstruction and conversely, where the original parts after replacement are so large a part of the whole structural substance as to preponderate over the new, there is not a reconstruction but only a repair."[3]

Who is Liable?

In the present patent statute there is a provision that one who actively induces infringement of a patent is liable as an infringer, but also, "Whoever sells a component of a patented machine, manufacture, combination or composition, or a material or apparatus for use in practicing a patented process, constituting a material part of the invention, knowing the same to be especially made or especially adapted for use in an infringement of such patent, and not a staple article or commodity

of commerce suitable for non-infringing use, shall be liable as a contributory infringer."[2]

Even before the adoption of the present statute, with these provisions against contributory infringement, the courts attached a taint of infringement to the acts of anyone participating in activities of this character.

Granting an injunction against not only a corporation, but its officers and directors as well, for infringement of a neon light patent, the court said, "All persons who participate in the infringement are liable although some are simply acting as officers of the corporation.

"A director and officer of a corporation who by a vote or otherwise specifically commands subordinate agents of the corporation to engage in the manufacture and sale of an infringing article," the court explained, "is liable individually in an action for damages brought for such infringement. It is immaterial whether the director or officer knew or was ignorant that the article manufactured and sold did infringe the patent."[4]

Intent Important

Circumstances, however, have been allowed to somewhat soften the harshness of this rule. A shop owner in Arkansas had been accustomed to repairing plunger pumps used in the oil industry. Although he had never made or sold a completed pump, he had for years conducted this repair business. In refusing to apply this rule condemning the reconstruction of patented machines as contributory infringement, the court said:

"The question in contributory infringement is whether or not the alleged infringer made or sold his machine or improvement with the intent or purpose of aiding another in the unlawful making, selling or using of a third person's patented invention.

"The mere fact that it is capable of such a use when it is at the same time capable and fitted for rightful and innocent use, is not sufficient to establish such an intention or purpose where, as in this case, the evidence is that the machine and its parts were expressly fitted for use in a rightful way without aiding in such infringement and there is no evidence that the alleged infringer ever knew of the use of the machine or that it was ever sold or used in such a way as to aid others in infringing the patented invention."[5]

Another benison bestowed by the courts on innocent infringers of this character was the subject of a comment by a court in California relating to the violations of a patentee's rights by infringements that are unintentional.

A special type of steel barrels had been patented. A technical infringement was committed by one who made up such containers with no knowledge of the earlier patented article. Of situations such as this the Federal court made the comment:

"If it should be found that the barrels of the infringing character so manufactured are of substantial amount and number the patent owner would be entitled to damages. But if it shall appear that the infringing barrel was made by accident and that there were no other infringing barrels, the costs of this entire litigation will be upon the patent owner."[6]

Replacement of Components

Infringement (and its penalties) does not, however, extend to the mere repair of patented machines when they are part of efforts to save such machines from total loss and the scrap pile. Such situations occur frequently.

When, many years ago, such an incident came before the Supreme Court, a rule was laid down that remains unchallenged after more than a century. Worn knives of a patented planing machine were replaced by the user. The owner of the patent and manufacturer of the machine charged the user with infringement for his substitution of new knives.

"The right of the owner to replace the cutter knives," said that court, "is not because they are of perishable materials but because the inventor of the machine had so arranged them as a part of this combination, that the machine could not be continued in use without a succession of knives at short intervals. Unless they were replaced the invention would have been of but little use to the inventor or to others.

"The other constituent parts of the invention, though liable to be worn out, are not made with reference to any use of them which will require them to be replaced. These without having a definite duration, are contemplated by the inventor to last so long as the materials of which they are formed can hold together in use in such a combination.

"No replacement of them at intermediate intervals is meant or is necessary. They may be repaired as the use may require. With such intention they are put into the structure. So it is understood by the purchaser and beyond the duration of them a purchaser of the machine has not a longer use."

Of those non-permanent parts of this planing machine, the court continued, "But if another constituent part of the combination is meant to be only temporary in the use of the whole and to be frequently replaced because it will not last as long as the other parts of the combination, its inventor cannot complain, even if he sells the use of his machine, that the purchaser uses it in the way the inventor meant it to be used and in the only way in which the machine can be used.

"Such a replacement of temporary parts does not alter the identity of the machine but preserves it though there may not be in it every part of its original material."[7]

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[1] Neff Instrument Corp. vs. Cohu Electronics, Inc., 269 Fed. 2d 668, Calif. Aug. 6, 1959.
[2] 35 U.S.C.A., Sec. 271.
[3] Landis Machinery Co. vs. Chase Tool Co., 141 Fed. 2d 800, Mich., Apr. 4, 1944.
[4] Claude Neon Lights, Inc. vs. American Nee Light Corp., 39 Fed. 2d 548, N.Y., Mar. 3, 1930.
[5] El Dorado Foundry Machine & Supply Co. vs. Fluid Packed Paint Co., 81 Fed. 2d 782, Ark., Feb. 24, 1936
[6] Meurer Steel Barrel Co. vs. Boyle, 9 Fed. 2d 92, Calif. Dec. 14, 1925.
[7] Wilson vs. Simpson, 50 U.S. 109, Jan., 1850.

Extra copies of this article are available while supply lasts. Write Tooling & Production Magazine, 1975 Lee Road, Cleveland 18.

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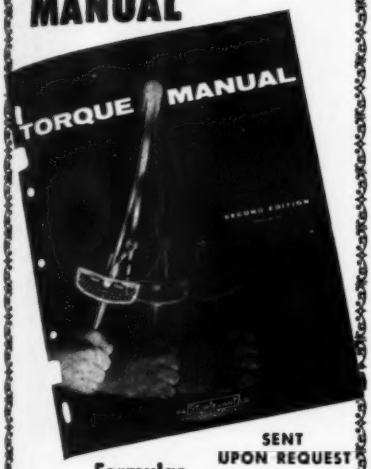

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- Formulas
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That's the kind of quick heating action you get with this compact, powerful furnace. It's economical to operate, too. Fast heat-up saves time and gas. High-temperature insulated firebox, 5" by 7¾" by 13½", gives even hardening of high speed and carbon steel dies, tools and small parts. Temperature easily regulated. G.E. motor and Johnson Blower included. 120,000 BTUs per hour.

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No. 120 also available in bench style.

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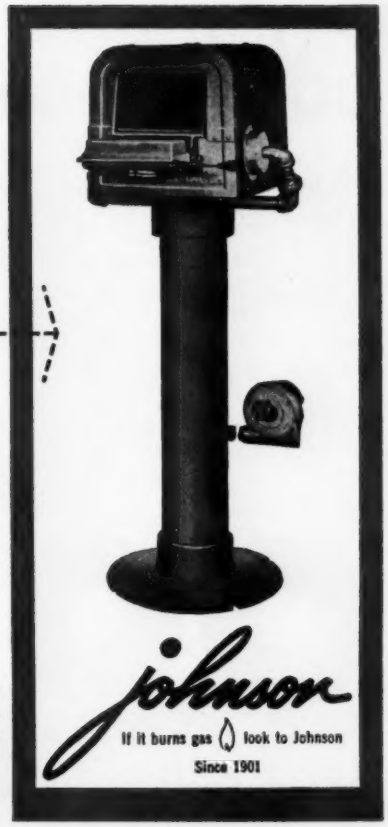

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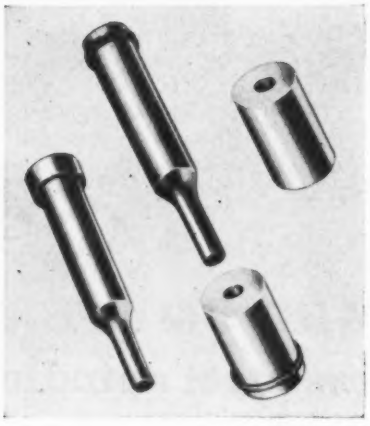
Catalogs and other helpful literature

A Variety of Drilling, tapping, boring, reaming, and spot facing operations — on as many as five sides of a part in one work cycle — are the specialty of a versatile Universal machine, described in Bulletin 56 from Wisconsin Drill Head Co. Circle No. C1.

Manual and Electrically operated and remotely controlled pressure regulators in Marotta Valve Corp.'s RV-23 series are described in a 12-page folder. They're for 50 to 10,000 psig inlet operating pressures. For a copy of the folder, Circle Inform-A-Gram No. C2.

Dies cost less to build, less to buy when you specify RING Punches and Dies



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WRITE Dept. A for New Catalog of headed and Ring punches and dies, ejector punches, shoulder and bevel quills, and stripper guide bushings.

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OF THE PRODUCTO MACHINE COMPANY
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PRODUCTO

CIRCLE INFORM-A-GRAM KEY NO. 86

Drills, Reamers, End Mills, and other types of cutting tools are described and priced in Chicago-Latrobe's new 68-page Catalog No. 60. For a copy, Circle No. C3.

Molded Nylon and Delrin parts, available from stock molds, are described in a new catalog from Nylomatic Corp. For a copy, Circle Inform-A-Gram No. C4.

"Essentials of Rotary Gear Shaving" is title and topic of a reference manual (5-60-1B) from National Broach & Machine Co. Get a copy of the 18-page manual by Circling No. C5.

An Up-To-The-Minute Summary of the forms, properties, and applications of Dow Corning Silicones is in a new 16-page brochure from Dow Corning Corp. For a copy, Circle No. C6.

Automation Technology, equipment, and economics are discussed in a new management-oriented publication from General Electric Co. "Automation and You" (GED-3908) provides information on key functions of automation, such as process control, computing, instrumentation, machine control, and communications. For a copy, Circle Inform-A-Gram No. C7.

A Handy Wallet-Size decimal equivalent chart is available from Tube Distributors Co., Inc. For a copy, Circle No. C8.

All-Purpose Jaw Clamps, which eliminate the use of U-clamps, straps, and fingers, are described in a bulletin from J & S Tool Co. For a copy, Circle No. C9.

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ELMIRA, N.Y.

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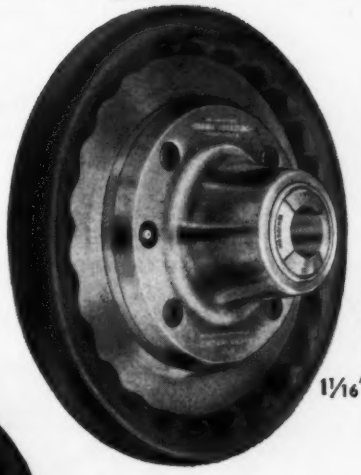
Quality at Low Cost

HARDINGE-SJOGREN Speed Collet Chucks for tool room lathes, engine lathes and grinders.

Available for Threaded Nose, Cam Lock, Taper Key Drive and American Standard Spindles.



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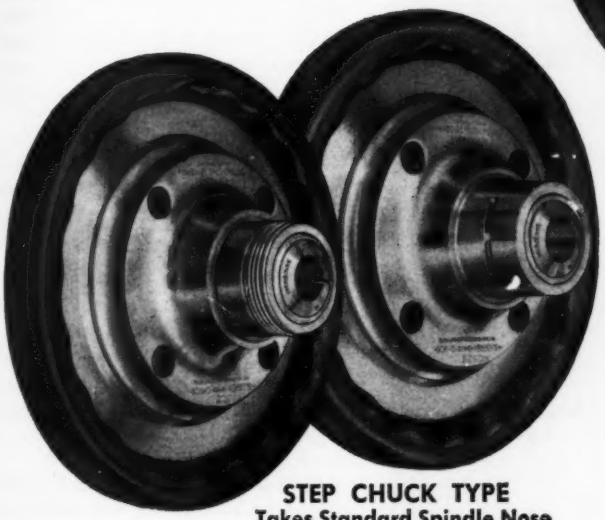
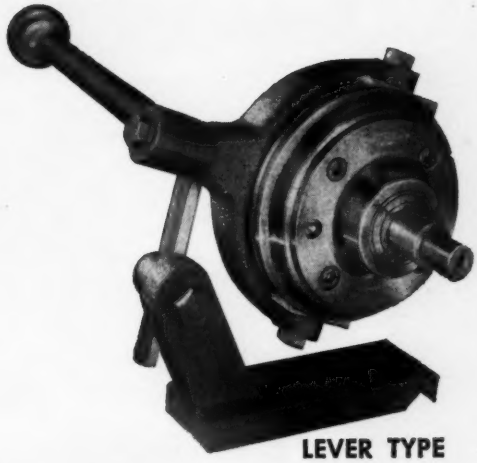


STEP CHUCK TYPE
Takes Standard Spindle Nose Accessories As Used With Hardinge Precision Machines



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Ask Your Hardinge Representative or Local Distributor For Bulletin 88

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Maximum efficiency — Pay for only what you use. Records show that 82% of all sizes used are standard 16th sizes.

Buy only the sizes you use—Hardinge Collet stocks are available in:

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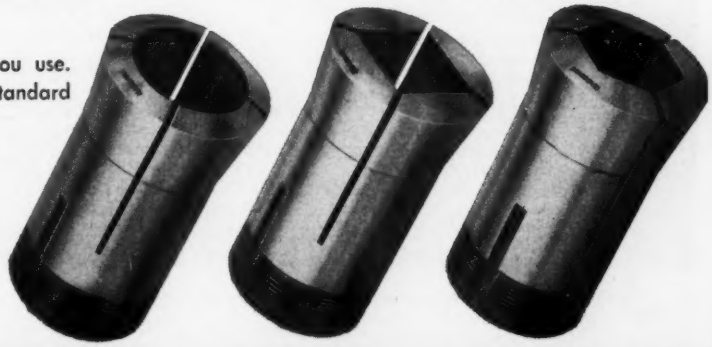


HARDINGE BROTHERS, INC., ELMIRA, N. Y. U.S.A.

CIRCLE INFORM-A-GRAM KEY NO. 87

Catalogs . . .

High Speed Photography, an engineering tool for studying actions too fast for the eye to resolve, is subject of a new bulletin from Wollensak Optical Co. Circle No. C10 for a copy.

Jig and Fixture components are listed and illustrated in the big catalog from Carr Lane Manufacturing Co. For a copy, Circle Inform-A-Gram No. C11.

Pla-Chek Gages from Cadillac Gage Co., as well as their thread analyzer and Super-Chek gage for speedy checking of cylindrical gages and high precision parts, are subject of a new catalog. For a copy, Circle No. C12.

The GV Metal Worker, for sheet and plate cutting, bending, folding, etc., is described in a new catalog from Homestrand Machine Tool Corp. For a copy, Circle No. C13.

The New Automatic turret lathe in the Pratt & Whitney Co. line (the 3E-15) is described in new Bulletin No. 177. Tape control is an option with the lathe. For details, Circle No. C14.

Surface Speed Table and tool selector chart for high speed steel, tantung, carbide, and ceramic tools is available from Vascoloy-Ramet. For a copy, Circle No. C15.

Hole Locating and concentricity gages are shown in a new Con-Chek gages bulletin, available from Mayes Tool Co. For a copy, Circle Inform-A-Gram No. C16.

High-Pressure Extrusion press valves overlaid with aluminum bronze weldrod to protect against scratching and galling are featured in the latest Ampco Welding News. For a copy, Circle No. C17.

The Increased Range of the T-J Squair Head air and hydraulic cylinder is described in 16-page SQ-10-58 from The Tomkins-Johnson Co. For a copy, Circle Inform-A-Gram No. C18.

The Band Mill, largest of Do-All's Contour-matic band machines, is described in a new catalog. Applications are also pictured. For a copy, Circle No. C19.

Broaches and broaching fixtures in the Red Ring line are described in Catalog B 60-4 from National Broach & Machine Co. Circle No. C20.

Equipment and Processes for shaving engine camshaft gears are subject of catalog sheet CS 60-1 from National Broach & Machine Co. For a copy, Circle No. C21.

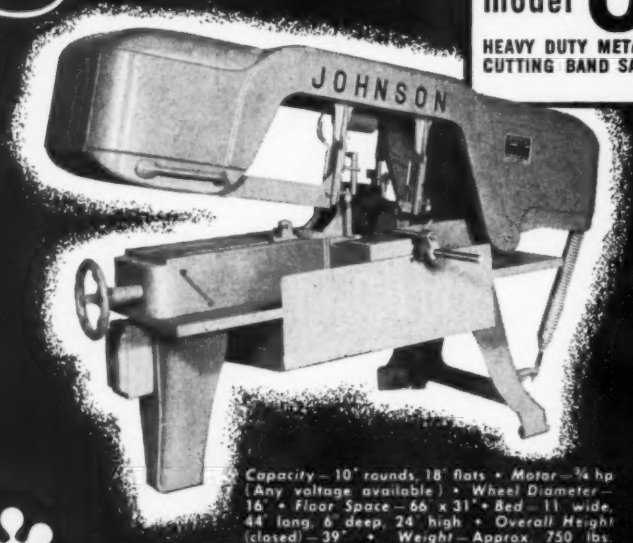
Handy Kits of industrial hose with Parker "Push-lok" fittings, for easy installation and quick replacement, are described in a new bulletin from Parker - Hannifin Corp. For a copy, Circle No. C22.

COMPARE

and you'll get a BIG NEW

Johnson model J

HEAVY DUTY METAL CUTTING BAND SAW



Capacity — 10" rounds, 18" flats • Motor — ¾ hp (Any voltage available) • Wheel Diameter — 16" • Floor Space — 66 x 31" • Bed — 11" wide, 44" long, 6" deep, 24" high • Overall Height (closed) — 39" • Weight — Approx. 750 lbs. • Speeds — 36, 90, 130, 190 feet per minute.

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- Johnson leads the way in dependable, well-engineered, high performance band saws.
- A Johnson saw will cut anything in your stock pile, and do it faster.
- Johnson saws contain more exclusive construction and performance features that save time and money.
- Johnson saws are the finest metal cutting machines available anywhere—and, at the lowest price!

COMPARE . . . and see for yourself how easily you can save time, labor and production dollars with a Johnson saw. Complete information, prices — are yours for the asking.

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CIRCLE INFORM-A-GRAM KEY NO. 88

YOUR INFORM-A-GRAM CARD FOLLOWS PAGE 76 IN THIS ISSUE.

It is for your convenience when making inquiries.

Catalogs . .

Analysis and Comparisons of various low temperature brazing alloys are published in a folder from American Brazing Alloys Corp. For a copy, Circle No. C23.

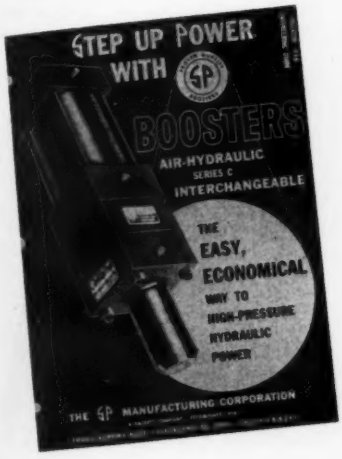
Piercing, Notching, and blanking presses in the WARCO line, in capacities from 100 to 800 tons, are described in Bulletin No. 52200 from Federal Machine & Welder Co. For a copy, Circle No. C24.

Electro-Mechanical Control systems and components for use on a variety of production machinery are described in new Bulletin EE-1008 from the Electronics Div'n, Seneca Falls Machine Co. Circle Inform-A-Gram No. C25.

Full-Size Tracing Templates of a complete line of small size hydraulic and pneumatic cylinders are offered in 16-page Form 30 from Control Line Equipment. For a copy, Circle No. C26.

Drilling Machines featuring tape control are subject of a bulletin from Lahr Machine & Tool Corp. New designs include a heavy-duty single column turret machine, a 6-spindle planer-type turret machine, a planer-type vertical machine with automatic tool changer, and a quill-type machine with twin tilting tables. Circle No. C27.

An Easy-To-Use Handbook of many air-hydraulic interchangeable boosters is available from The S-P Manufacturing Corp. Ask for Engineering Guide #116, or Circle Inform-A-Gram No. C28.



A New Milling Equipment bulletin tells about three sizes of portable Versa-Mil attachments for milling, drilling, slotting, boring, shaping, grinding, and related operations on small, medium, and large work. Get bulletin VM-60 from The Dumore Co., or Circle Inform-A-Gram No. C29.

New Cam Locking jig vise, Controlled-Flo coolant pump and tank unit, and soft chuck jaws are subject of a bulletin from Morton Tool Co. For copy, Circle No. C30.

Examples of How Self-Leveling work positioners solve material positioning and handling problems are described and illustrated in a 6-page brochure from the Lowerator Div'n of American Machine & Foundry Co. Circle No. C31.

New Approaches to Gaging problems are explained in Deltronic's 4-page booklet that shows suggested uses of Tenth Plug gage kits and Precision Micro-Ball gage kits. For a copy, Circle Inform-A-Gram No. C32.

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Durable Punch & Die Company is your one best source of information regarding metal and plastic piercing applications. Durable's engineering knowhow helps solve perforating problems. Durable's perforators punch straight holes to reamer accuracy; hold close tolerances; perforates at angles; pierces round stock. They too have proven their value in cold piercing straight, burr free holes in Phenolic laminated plastics. Durable perforators give longer punch life because they are completely supported, vertically lapped and chrome plated to retard firing and galling, and to provide for easier stripping.
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CIRCLE INFORM-A-GRAM KEY NO. 89

Catalogs . .

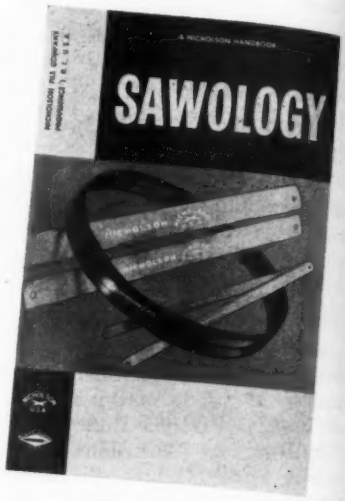
Various Grades of Wessonmetal cemented straight-tungsten and compound carbides are described in 4-page Technical Data Paper No. 60-1WM from Wesson Company. For a copy, Circle No. C33.

Toggle Clamps added to the De-Sta-Co Line of standards are described in Bulletin #601606 from Detroit Stamping Co. Circle Inform-A-Gram No. C34.

Automatic Printed Circuit board soldering system that handles up to 600 assemblies/hr is covered in Catalog A-1090 from the Industrial and Automation Div'n, Radio Corp. of America. Circle No. C35.

Price Lists for the complete line of 25 epoxy resin based plastic materials for laminating, surface and mass casting, and paste applications are available from Ren Plastics, Inc. For a copy, Circle Inform-A-Gram No. C36.

"Sawology," a Nicholson File Co. handbook, is a good treatise on the



selection and use of hacksaw and band saw blades. For a copy, Circle Inform-A-Gram No. C37.

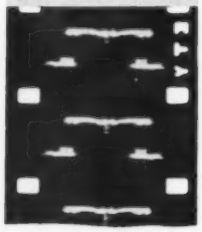
Milling Cutters, single- and multi-point tools, and related products such as drive collars, special arbors, micrometric spacers, and the Wickman carbide impregnator, are featured in an 8-page brochure from O.K. Tool Co. For a copy, Circle No. C38.

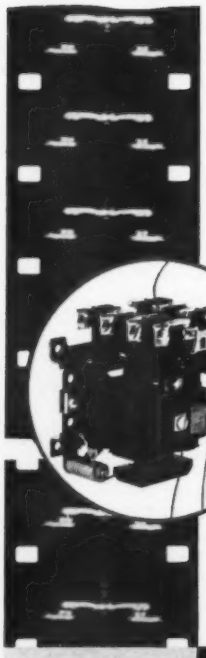
Natural Quartz crystal transducers and associated electronic equipment for pressure, force, acceleration, and vibration measurements are subject of a new brochure from Kistler Instrument Corp. For a copy of Bulletin 1011-60, Circle No. C39.

The Expanded Line of Cleveland end mills and the new Cleveland

milling cutters are included in the new 64-page catalog from The Cleveland Twist Drill Co. For a copy, Circle No. C40.

Actual reproductions from FASTAX high-speed films, taken at 7,500 frames per second, used to analyze contact operation.





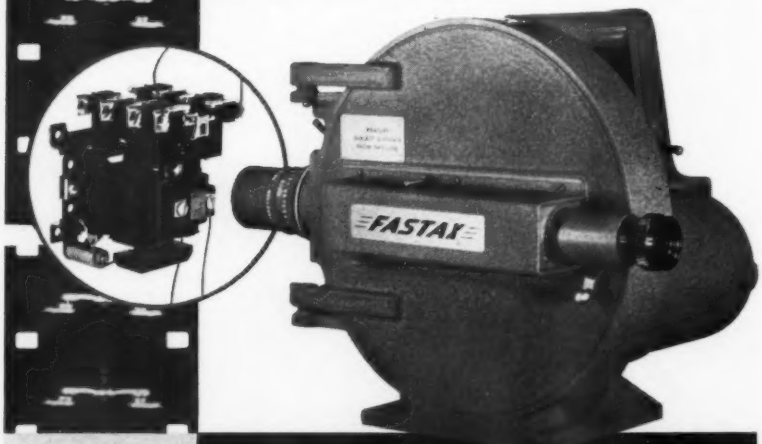
How Allen-Bradley uses *FASTAX* to check super-speed components

Allen-Bradley engineers had to *know* how contacts in their motor control relays stood up under stress, when operating too fast for the human eye to follow.

Using a FASTAX high speed motion picture camera, they *photographed* contact action and got a permanent, accurate record at a film speed of 7500 frames per second.

Later, when projected at slow speeds, Allen-Bradley engineers could examine the structural behavior of relay components—contacts, plungers and springs. Motion studies like this have helped develop better relays for A-B customers.

For all around research and industrial use, the FASTAX is the most versatile motion analysis tool available. With framing rates up to 18,000 pps and effective shutter speeds up to 1/800,000 of a second high speed subjects of every variety can be observed in slow motion.



WRITE for new descriptive literature.

WOLLENSAK

OPTICAL COMPANY • ROCHESTER 21, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 90

Catalogs . .

Slide Calculators for determining machinability, carbide grade, surface feed, depth of cut, and related data are available in a set — a Carb-a-Guide and a Computer Slide — from the Adamas Carbide Corp. For a set, Circle No. C41.

New Die Saver switch control system from Robotron Corp. is described in a bulletin. It automatically stops the press should any malfunction, misfeed, or failure to strip or eject occur. For a bulletin, Circle No C42.

Extruded Special aluminum bronze rectangles for severe wear and abrasion applications are described in a revised bulletin (G-50a) from Ampco Metal, Inc. For a copy, Circle No. C43.

Automatic Pressroom equipment — slide feeds, roll feeds, stock reels, stock straighteners, coil cradles, etc. — are illustrated and described in a new Bulletin #85-60 from U.S. Tool Co., Inc., Ampere (E. Orange), N. J. For a copy, Circle No. C44.

Bearings, Bushings, Bar stock and babbitt metal are subjects of a 16-page booklet from The American Crucible Products Co. For a copy, Circle No. C45.

New Precision Tools for small parts handling are described in a catalog from Handicraft Tools, Inc., a Div'n of X-acto, Inc. It includes tools for cutting, trimming, slicing, deburring, etching, and parts-holding. For a copy, Circle Inform-A-Gram No. C46.

Technical Information on the Kent-Owens No. 3-36 hydraulic milling machines, their features and operation, is offered in a new bulletin from Kent-Owens Machine Co. For a copy, Circle Inform-A-Gram No. C47.

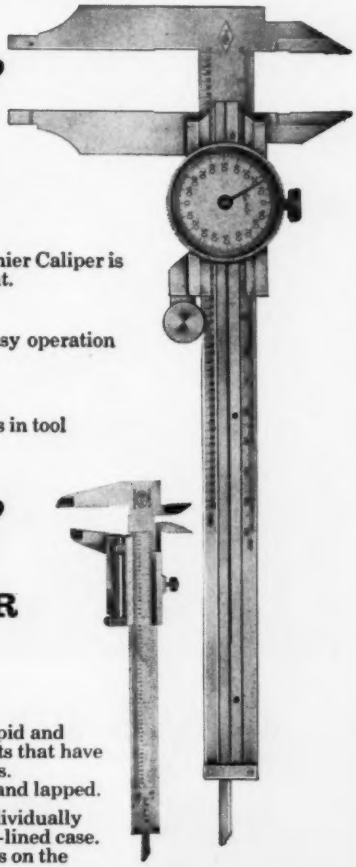
Automatic Power Saws for straight cut-off work and for mitering and angular work, as well, are described in a new 12-page catalog from The DoAll Co. For a copy, Circle Inform-A-Gram No. C48.

"Tiny Toggle" and miniaturized clamps are described in Bulletin #102105 from Detroit Stamping Co. For a copy, Circle Inform-A-Gram No. C49.

New Dial - A - Breaker Kendex tool specifications are in Kennametal, Inc.'s catalog supplement #10A, which covers 76 tools. It illustrates the fine screw-adjustment feature of the attached chip-breakers, as provided by an easily accessible thumb dial. For a copy, Circle Inform-A-Gram No. C50.

Eliminate costly reading errors with the

"HELIOS"
DIAL VERNIER CALIPER with built-in DIAL INDICATOR
Direct Reading in .001"



The world famous "HELIOS" Dial Vernier Caliper is hardened, ground and lapped throughout.

Other features:

- Thumb roll permits quick and easy operation
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- 100% measuring capacity (outside, inside and depth.)

Available in 5", 6", 8" and 10" capacities in tool steel or stainless steel.

Height Gage Attachment optional.

"HELIOS"
SWING-JAW VERNIER CALIPER
with knurled lock screw

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- Capacity 4¾"
- Length of Jaw 1⅝"

The swinging jaw allows a very easy, rapid and extremely accurate measurement of parts that have faces which do not lie along the same axis. This caliper is stainless steel, hardened and lapped.

Every "HELIOS" Vernier Caliper is individually packaged in a beautiful hardwood velvet-lined case. Write for detailed information and prices on the "HELIOS" Caliper line.

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A DIVISION OF MACHINERY BUILDERS, INC.
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"Over 25 years' experience in designing and building machinery."

CIRCLE INFORM-A-GRAM KEY NO. 91

Catalogs . .

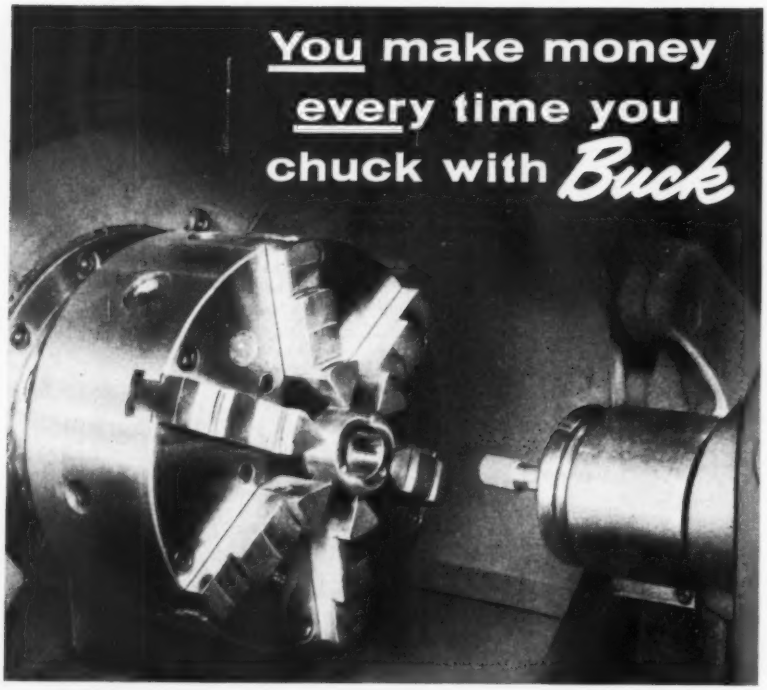
Primary and Mill Products produced by Harvey Aluminum are described in a 12-page booklet. For a copy, Circle No. C51.

The New Versa-Tap hand tapping machine, as well as the Producto Machine Co. Toolroom Equipment Div'n's die assembler, Roto-Recipro toolmaking machine, and toolroom vises, are in a new bulletin. Circle Inform-A-Gram No. C52 for a copy.

Carbide Tipped Saws of many kinds — in the Meyco line — are described in the latest bulletin from W. F. Meyers Co., Inc. For a copy, Circle Inform-A-Gram No. C53.

Design Considerations and examples of metal joints which lend themselves to use of brazing alloys in preformed shapes are included in a comprehensive booklet, "Preforms," from Lucas-Milhaupt Engineering Co. For a copy, Circle Inform-A-Gram No. C54.

Only a rich man can afford old-style chucks!



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If you haven't yet put Buck Ajust-Tru® chucks to work in your plant there are big and profitable performance surprises ahead. Send for complete information. "It pays to chuck with Buck."

Makers of Scroll, Power, Dust Proof, Independent Chucks.

BUCK TOOL COMPANY

818 SCHIPPERS LANE • KALAMAZOO, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 92

Vibratory Parts and materials handling equipment and other tools and products of Syntron Co. are in the new condensed Catalog 605. For a copy, Circle Inform-A-Gram No. C55.

Vital Factors to be considered by prospective purchasers of jig borers are in check list form in Moore Special Tool Co.'s new bulletin, "The Ten Musts of a Jig Borer." For a copy, Circle No. C56.

A New Autocollimator for precision measurement of angular position and small linear displacements is introduced by the Gaertner Scientific Corp. in Bulletin 205-60, which gives applications, specifications, and descriptions of the instrument's operation. Circle Inform-A-Gram No. C57.

Newly Designed OBI presses — 7- to 125-ton capacities in either geared or flywheel types — are featured in Federal Press Co.'s new catalog. Specifications on all models are included. Circle No. C58.

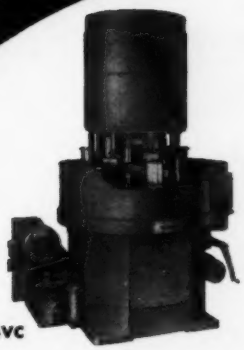
New Pull-Pin Ejector punches, that permit rapid removal of the ejector pin for point sharpening are featured in a new bulletin from Ring Punch & Die Div'n of The Producto Machine Co. Other types of punches and bushings are also illustrated. Circle No. C59.

Clarification of Water soluable oil coolants by U.S. Hoffman Machinery Corp. "Flotation" units is subject of Bulletin FB-102. For a copy, Circle No. C60.

Case Studies of the use of central oil filtration systems in plants are outlined in Case Study #11 from U.S. Hoffman Machinery Corp. For a copy, Circle No. C61.

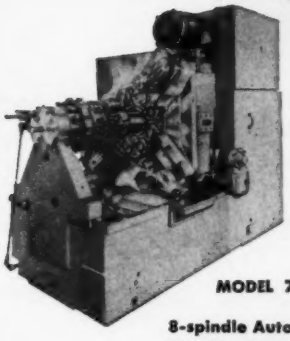
With Simple Controls, the new Cri-Dan Model E high speed, semi-automatic, single-point threading lathe generates very accurate lead and thread forms. For details, get Bulletin 1226 from Gisholt Machine Co., or Circle Inform-A-Gram No. C62.

Toolroom Grinding wheels are illustrated in a new bulletin (Form ESA-272) from Simonds Abrasive Co. Borolon aluminum oxide is featured. For a copy, Circle Inform-A-Gram No. C63.



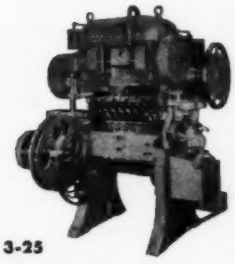
MODEL 84VC

Vertical Continuous Lathe
Remarkable New Improvements!



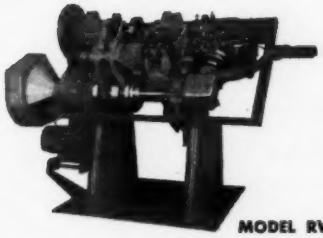
MODEL 78-H

8-spindle Automatic Multiple Chucking Machine
Important New Changes!



MODEL 3-25

Transfer Press for the High Production of Stamped and Drawn Parts
Many New Features!



MODEL RWI-1

Ribbon and Wire Inclinable Forming Machine
All New!

MACHINE TOOL EXPOSITION PREVIEW

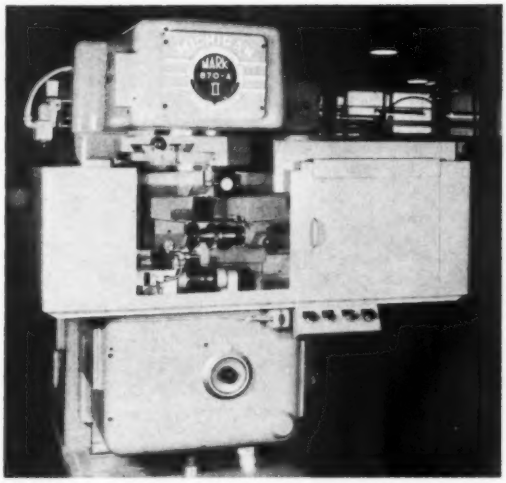
BETTER STOP AT BAIRD BOOTH 1142

Your visit to the Machine Tool Builders' Show will not be complete if you miss the opportunity of seeing these 4 Baird high production performers in actual operation. The just-introduced RWI-1 represents the most startling innovation in ribbon and wire forming machinery in years ... important new design changes highlight the well-known Baird Transfer Presses, Chuckers and Vertical Continuous Lathes. We have a few surprises waiting for you, too!

BAIRD **THE BAIRD MACHINE COMPANY** • Stratford, Conn.
Builders of High Production Machinery since 1846

Product News

Precision Gear Shavers

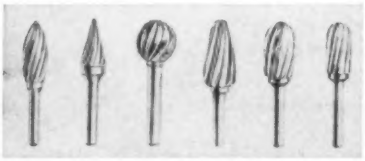


A new line of rotary gear shavers, the 870 Mark II, consists of three types of machines — an underpass, an internal, and a universal. Most machine settings are dial controlled for fast setup and simple change-over. The Universal model permits selection at will of underpass, modified underpass, or transverse shaving. Write the Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich., or Circle Inform-A-Gram No. P3.

Air Impact Tool

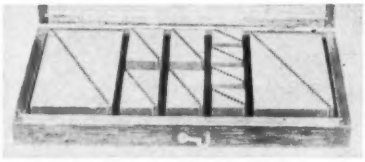
The new size 808 air operated Impactool features 20% more power and 200% faster rundown. It's only 7¼" long, weighs only 8-7/8 lbs, and handles work up to 5/8" bolt size. Ask for Form 5279 from Ingersoll-Rand Co., 11 Broadway, New York 4, N.Y., or Circle Inform-A-Gram No. P5.

Long-Lived Rotary Files



Better bite, faster stock removal, and longer life are possible with the new Facet Tooth tungsten carbide rotary files. A second trailing edge built into the length of each tooth permits reduction in the number of flutes and allows more freedom in design. Write Grobet File Co. of America, Inc., Carlstadt, N.J., or Circle No. P1.

Timesaving Step Block Set



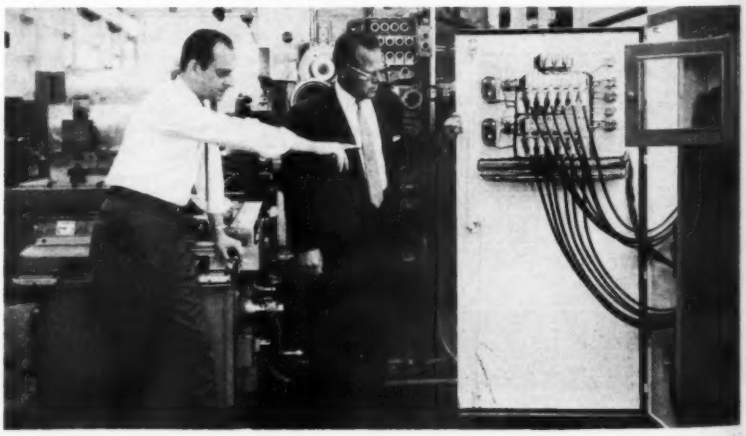
Versatile and compact, this new aluminum step block set eliminates the time spent looking for temporary blocks and shims for clamping. It consists of four blocks with a capacity of ¾" to 1½", four 1⅛" to 2½", and two 2½" to 6". Write Northwestern Tools, Inc., 116 Hollier Ave., Dayton 3, Ohio, or Circle Inform-A-Gram No. P4.

Pipe Tap Extension

Tap extensions to fit pipe taps from 1/16" through 1/2" have been added to the Walton Style B line. The close tolerance, heat treated, 8" extensions allow either machine or hand tapping of otherwise inaccessible holes. Write The Walton Co., Box 5, Elmwood Branch, Hartford 10, Conn., or Circle Inform-A-Gram No. P6.

Tape Control System

Automatic programming of Jigmils is done by Tapac, a point-to-point tape control system for automatic measuring, positioning, and cycling. Automatic functions include positioning of slides, spindle depth control cycling, and control of spindle speeds and feeds. Write DeVlieg Machine Co., Fair St., Royal Oak, Mich., or Circle Inform-A-Gram No. P2.



Product News

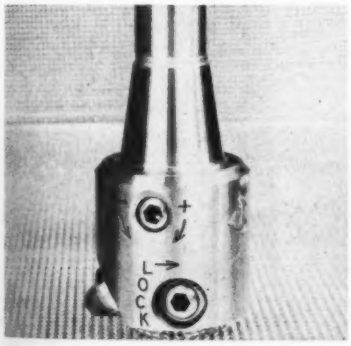
Screw Thread Comparator

The O-Vee screw thread comparator records variation of pitch diameter on the easy-to-read indicator scale equipped with toler-

ance pointers. Measuring elements are pairs of helical springs of the correct size wire for the thread being measured. For data, write to Scherr-Tumico, 200 Lafayette St., New York 12, or Circle Inform-A-Gram No. P7.

Boring-Milling Cutter

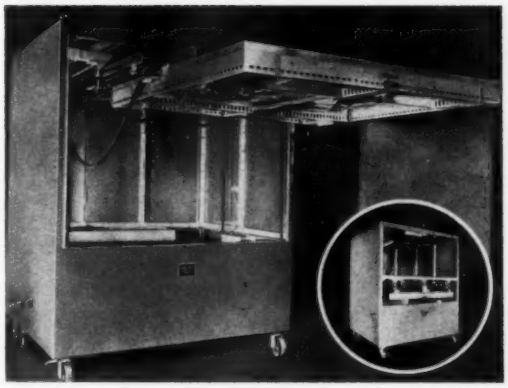
The Concentric Bore Mill cutters are adjustable from 30° positive to 30° negative rake to eliminate grinding of special angles. Precis-



ion boring or milling is done with the same cutter, which requires only one wrench for all adjustments. Get data from Concentric Tool & Instrument Corp., Farmingdale, L. I., N. Y., or Circle Inform-A-Gram No. P8.

Portable Radiant Heater

Heat loss during transfer of hot forming blanks is reduced with this new portable radiant heater. Temperatures up to 1500°F can be delivered instantly by the retractable lamp head. Contact The Electric Hotpack Co., Inc., 5025-A Cottman St., Phila. 35, Pa., or Circle No. P9.

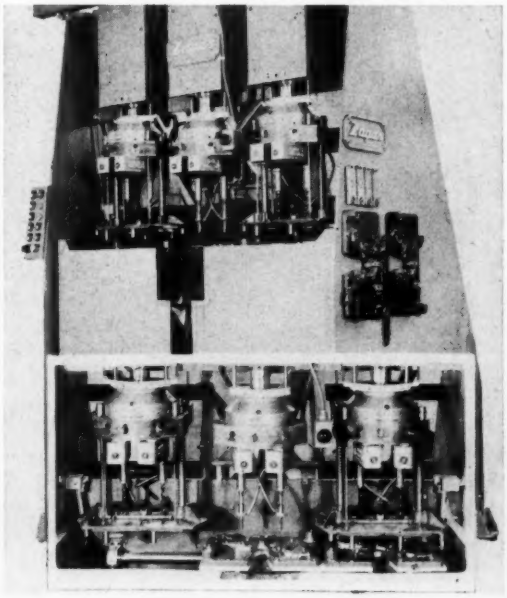


Cross-Slide Rotary Table

Work is positioned rapidly and accurately with this cross-slide rotary table. The part remains in the original position on the table until all operations are completed. Get details from Advance Products Corp., North Shore Drive, Benton Harbor, Mich., or Circle Inform-A-Gram No. P11.

Short Run Drilling

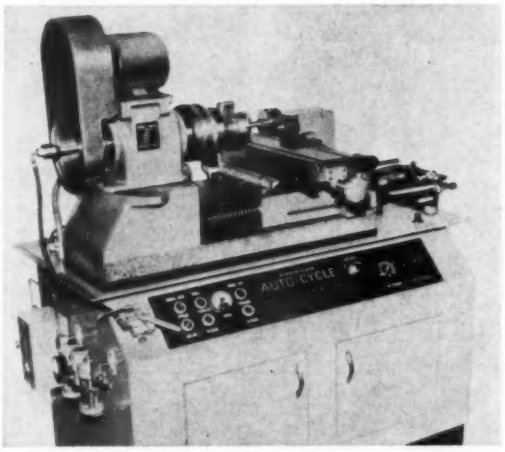
This new 3-station unit drills and taps up to 25 different shafts with different hole spacings or patterns. It uses only two sets of fixtures and two sets of bushings. An air-operated shuttle moves the work holding fixture between the work stations. Write Zagar, Inc., 23894 Lakeland Blvd., Cleveland 23, or Circle Inform-A-Gram No. P10.



Product News

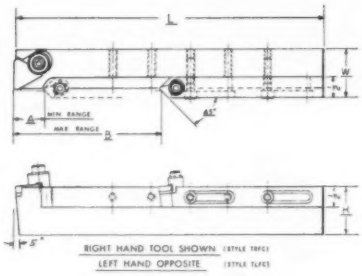
Close Tolerance Boring

Nine operations in one automatic cycle are done with standard tools on the Auto-Cycle Model SSA precision boring machine. Its solid granite base plate insures accuracy of 0.000050". Contact Industrial Machinery Div'n, American Electronics, Inc., Norwood, Mass., or Circle No. P12.



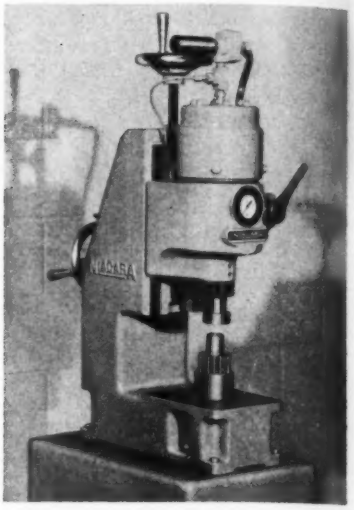
Face-Chamfer

A new standard adjustable combination facing and chamfering tool, using throwaway carbide inserts, is offered by Allied Tool Products, Inc., 2105 W. Auer Ave., Milwaukee. It can also be used as a combination boring and chamfering toolholder. Circle Inform-A-Gram No. P13.



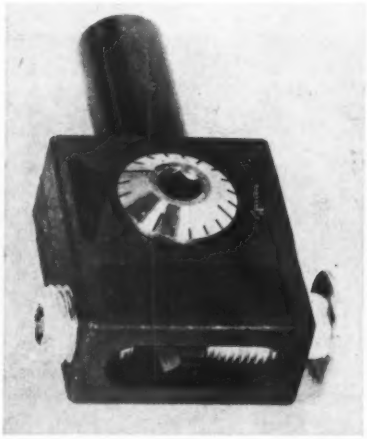
Single-Acting Air Presses

Twenty-eight new models of precision-built, single-acting air presses offer a wide selection for punching, swaging, staking, upsetting, and imprinting. Four sizes and three air and three electrical control systems are available. Bulletin 85 has details. Write Niagara Machine & Tool Works, 683 Northland Ave., Buffalo 11, N. Y., or Circle Inform-A-Gram No. P16.



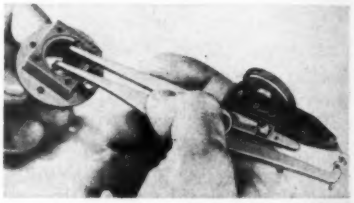
Precision Toolholder

A new Microflex toolholder for positive adjustment of finer finish cuts to 0.000050" is announced by Hardinge Brothers, Inc., Elmira, N. Y. A taper set screw acts as a wedge and flexes the body of the toolholder in relation to the shank for rigid support and clamping. Circle Inform-A-Gram No. P14.



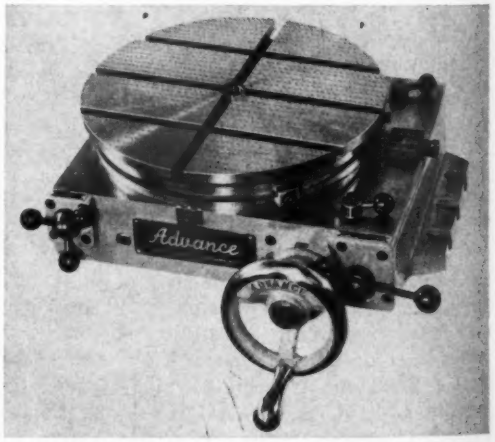
Universal Bore Gage

Here's a simple holder, to which any "Last Word" type indicator may be attached for measuring a large range of bores, O-ring grooves, thread reliefs, and undercuts. Capacity of this universal bore gage is from 0.200" to 6.000". Write Montgomery and Co., Inc., 401 Morris Ave., Springfield, N. J., or Circle Inform-A-Gram No. P17.



Precision Rotary Table

This 15" rotary table has 30 sec accuracy, sealed base construction, instant worm disengagement, and expansion type brake and lock. An indexing attachment is optional. Contact Advance Products Corp., North Shore Drive, Benton Harbor, Mich., or Circle No. P15.



ARE YOU PROPERLY GEARED FOR

MINIATURIZATION?

USE THE PERFECT COMBINATION For MICRO-DRILLING

SPHINX

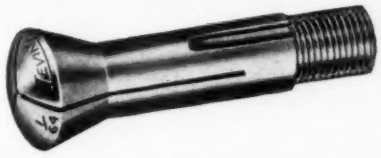
HIGH SPEED STEEL MICRO-DRILLS

Drills from .0016" to .0591" are stocked in increments of .0004" (.01 mm). From .0610" to .1181" in increments of .0020" (.05 mm). Left hand micro-drills for use on Swiss type automatic screw machines. Short flute center drills. Send for Bulletin "Q" listing complete line of drills or Catalog T listing collets as well as full line of instrument lathes and accessories.

Louis Levin & Son, Inc., 3610 S. Broadway, Los Angeles 7, California.

LEVIN ®

SUPER PRECISION **COLLETS**



Super precision collets for jewelers type lathes. Ideal for holding micro-drills or other parts where concentricity is important. Available from stock in complete range of sizes from .004" (.1 mm) to 5/16" (8.0 mm).

CIRCLE INFORM-A-GRAM KEY NO. 971

IN 11 SIZES No. 6 to 1" N.C. in all S. A. E. sizes.

You Need an Extra Hand Now to Speed Up Production!

HEIMANN TRANSFER SCREW SETS

Here is the *faster*, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench —no other tools needed. Get more work *now*—save money too!

HEIMANN MFG., CO. • URBANA, OHIO

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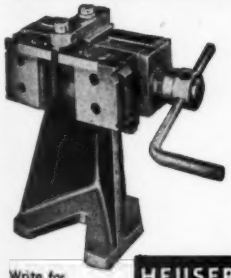
SPEED UP DRILLING & TAPPING JOBS!



JOHN'S DRILL JIG

For cross or end drilling round, hexagon, or square stock or standard or odd-shaped rough castings from 1/4" to 8" O.D., the self-centering "John's Drill Jig" will cut tooling and production costs to minimum for 10 to 100,000 pieces.

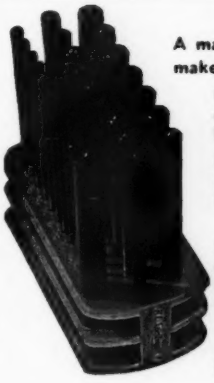
Standard removable slip fit bushings and holders available to drill center or mean off-center. The self-centering action will hold within .0015" or better regardless of jig wear or piece part O.D. variation. Jigs available in three sizes 6", 8", 14"; jaw openings 2", 3¼", 7½".

Write for complete information.

HEUSER MANUFACTURING CO.

1642 N. Paulina St., Chicago 22, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 973



SPELLMACO SPOTTERS

A matched set of transfer punches for toolmakers, machinists and tool cribs.

Used for transferring location of threaded, drilled and reamed holes, slugs, blanks, etc.

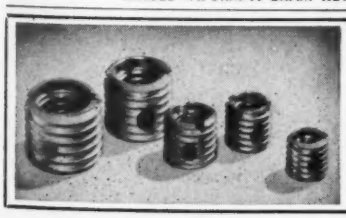
Precision made of finest tool steel carefully heat treated and tempered for long life. 0025 undersize to facilitate use—black oxide finish.

Set No. 3-17: 28 punches with indexed stand — sizes 3/32" to ½" by 1/64" plus handy 17/32" size—length 4⅞". PRICE only $19.40

Single sizes available.

R. L. SPELLMAN CO. • Urbana, Ohio

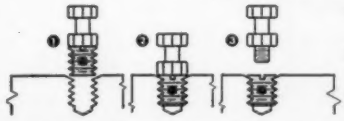
CIRCLE INFORM-A-GRAM KEY NO. 974



E-Z-LOK INSERTS

- Self-locking, threaded inserts.
- Vibration-resistant with patented NYLOK feature.
- Simple to remove and re-use.
- Use in aluminum, magnesium, plastic or cast-iron.

EASY 1-2-3 INSTALLATION



1. Drill, countersink (90° to 100°).
2. Tap National coarse thread.
3. Install with bolt or screwdriver.

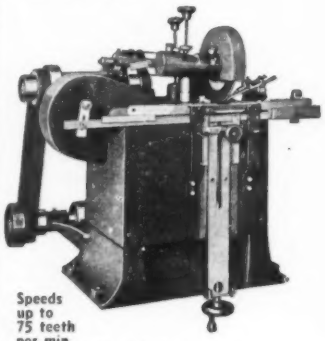
Distributors Wanted TOOL COMPONENTS, INC. Box 1036, Gardena, California

CIRCLE INFORM-A-GRAM KEY NO. 975

SAVED SAWS SAVE

Money you can put in your pocket!

Sharpening a gross of hack saws just 6 times will return the price of this Model EC Combination HACK, BAND and CIRCULAR Saw Sharpener.



Speeds up to 75 teeth per min. As fine as 32 per inch.

Get Complete Catalog

WARDWELL

MANUFACTURING CO.

3809 Ridge Road, Cleveland 9, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 981

HARDNESS TESTING

has been done with the **SCLEROSCOPE**

Since 1907

THE SHORE INSTRUMENT & MFG. CO., Inc.

90-35 Van Wyck Expressway

Jamaica 35, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 982

KELLER QUICK ACTING **Drill Press Vise**

ONLY $12.50

A rugged vise that sets up quickly to any angle. Jaws 2" deep x 4⅛" wide, open to 4¼", weight 16½ lbs.

Ask your Industrial Distributor or write TODAY for Bulletin 360.

Sales Service Mfg. Co.

2361 University Ave., St. Paul 14C, Minn.

CIRCLE INFORM-A-GRAM KEY NO. 983

YOUR INFORM-A-GRAM CARD FOLLOWS PAGE 76 IN THIS ISSUE.

Product News

Rub-On Lubricant

This Molykote molybdenum disulfide dry lubricating stick is rubbed over cutting and shaping tools, sliding areas of small and medium size machine parts, or wherever dry friction occurs on sliding surfaces. For details, write The Alpha-Molykote Corp., 65 Harvard Ave., Stamford, Conn., or Circle Inform-A-Gram No. P18.

Precision Mandrels

Shorter and lighter, but with the same wide expansion as LeCount Type B long straight jaw mandrels, is the new line of Compact models. It includes 14 mandrels ranging from ⅜" to 3¼" and with jaw bearings from 1" to 2½". Write LeCount Tool Works, Inc., 38 Cody St., West Hartford 10, Conn., or Circle No. P19.

Fiberglass Machine Mount

High density fiberglass is used in the Model N kinetic mounts to isolate vibration and eliminate the need to lag-down machinery. They are used where built-in level control is not required. Three standard sizes handle loads up to 8000 lbs / mount. Write Consolidated Kinetics Corp., 1065 Dublin Rd., Columbus 12, Ohio, or Circle Inform-A-Gram No. P20.

Compact Ultrasonic Machine

Precise machining of hard and brittle materials is done with this new, compact ultrasonic machine. For low production, it's mounted horizontally; and for high production, it's mounted vertically and up to 8 tools are used. Write The Sheffield Corp., Dayton 1, Ohio, or Circle Inform-A-Gram No. P21.

STANDARD ZAGAR Gearless DRILL HEADS

DRILL ANY NUMBER OF HOLES IN ANY PATTERN IN ANY MATERIAL ON ALL CENTERS

Write for Manual T-8

Drill a maximum number of holes in one pass—in any material Holes can be as close as twice drill diameter. Zagar gearless drillheads are built as a complete unit or may be adapted to any standard drill press. Send us your part drawing and we will submit our quotation.

23894 LAKELAND BLVD. • CLEVELAND 23, OHIO

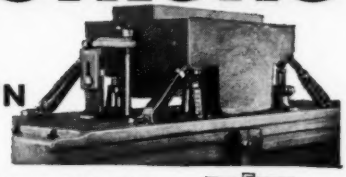
Zagar INCORPORATED

USE MORE SPINDLES TO DO MORE WORK

CIRCLE INFORM-A-GRAM KEY NO. 991

ARMSTRONG

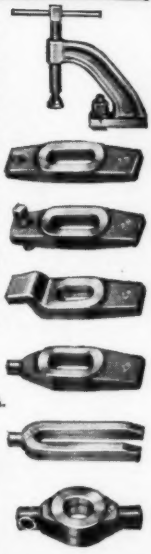
SET-UP *and* HOLD-DOWN TOOLS



ARMSTRONG Set-up and Hold-down Tools reduce setting-up time—keep men and machines producing. Designed for use on planers, drill presses, milling machines, etc., they hold work securely and rigidly, and thereby reduce spoilage and prevent costly accidents.

Your local Armstrong Distributor carries ARMSTRONG Set-up and Hold-down tools in stock in sizes for every operation. Stop haphazard setting-up methods. Provide each of your machines with a full complement of ARMSTRONG Set-up and Hold-down Tools.

Write for circular



ARMSTRONG BROS. TOOL CO.

5220 W. Armstrong Ave., Chicago 46, U.S.A.

CIRCLE INFORM-A-GRAM KEY NO. 992

faster changeovers boost press production

Whistler Magnetic Perforating Dies feature interchangeable parts fastened to steel templates which are patterned to the stamping. Punches and dies are assembled and disassembled in templates on an assembly bench while the presses are working on other production.

- **REDUCE DIE COSTS:** In one plant, over 1500 operations (for parts up to 3' x 5') have been tooled up at an average cost of $200 each.
- **EXTEND PUNCH AND DIE LIFE**
- **SAVE STORAGE SPACE**
- **ELIMINATE DELIVERY DELAYS:** Punches and dies stocked in .001" increments from .100" to .500" diameters. Other sizes in stock up to 3".

GET THE TIME AND MONEY SAVING STORY ON WHISTLER PRODUCTS:
magnetic dies • adjustable dies • custom dies

S. B. WHISTLER & SONS, INC.
748 Military Road, Buffalo 23, N. Y.

mail the following:
- ☐ Magna-Die Catalog
- ☐ Adjustable Die Catalog
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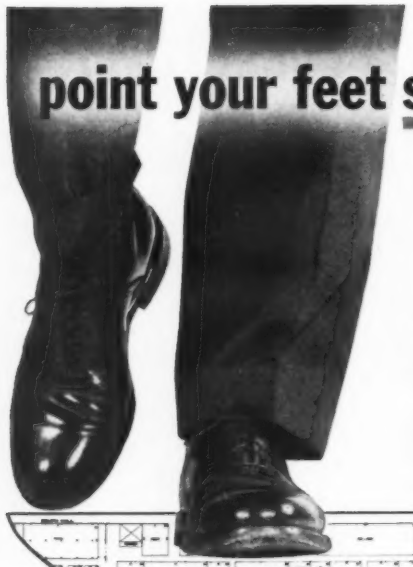
NAME _____ TITLE _____

COMPANY _____

STREET _____

CITY _____ ZONE _____ STATE _____

CIRCLE INFORM-A-GRAM KEY NO. 993

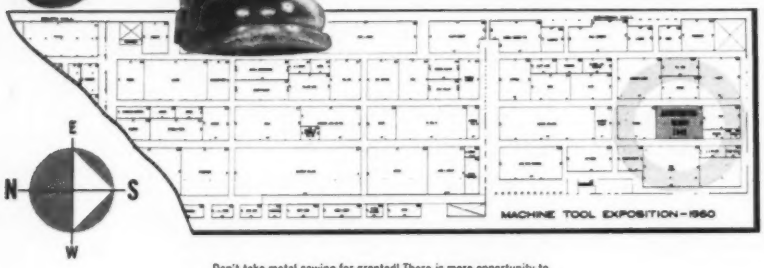


point your feet south to space

1340

to see the LARGEST, MOST COMPLETE SAWING DEMONSTRATION in the Amphitheatre

Be sure to see the MARVEL *"Sure-Line"* (patented) AUTOMATIC ACCURACY CONTROL



Don't take metal sawing for granted! There is more opportunity to save money in cutting-off operations today than ever before. To see why, make 1340, the MARVEL space location in the Machine Tool Exposition a sure stop when you're in the Amphitheatre.

Tons of steel will be cut-up by 14 MARVEL Hack Saw and Band Saw Machines in the largest sawing demonstration ever made—anywhere or at anytime. Among other things, you will see the most important development in metal sawing—the MARVEL "Sure-Line" Automatic Accuracy Control.

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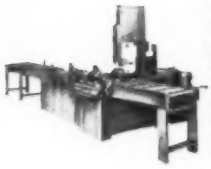

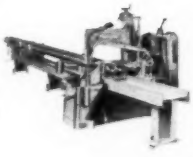

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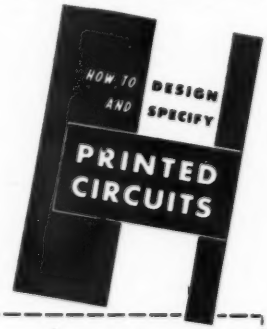

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Product News

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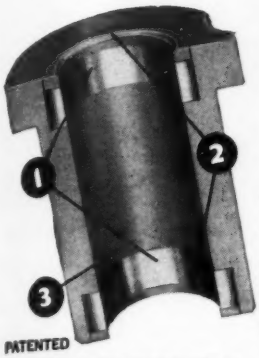
Versatile Belt Sander

Wood, plastic, or metal are handled on this 6" belt sander which can be used vertically, horizontal-

ly, or at any position in between. Curved work can be handled by this unit. For more information Write Duro Metal Products Co., 2651 N. Kildare Ave., Chicago, or Circle Inform-A-Gram No. P23.

THE INFORM-A-GRAM CARD FOLLOWING PAGE 76 IS FOR YOUR CONVENIENCE IN MAKING INQUIRIES.

Does the job of Solid Carbide and MEYCO COSTS LESS!



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for wear strips and wear plates

LENGTH: MEIER WEARITE is available in any length up to 10 feet.

AVAILABILITY: WEARITE comes right off the shelf of your local distributor... no waiting time for sizes now in stock.

SIZE: 94 different rectangular sizes 1/4" to 3" thick and 1" to 6" wide.

QUALITY: WEARITE is produced under strict laboratory controls. Tough (210–307 Brinell); strong (105,000 psi ultimate yield); and smooth surfaces with excellent wear characteristics.

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THIS DRILL ELIMINATES SECONDARY OPERATIONS

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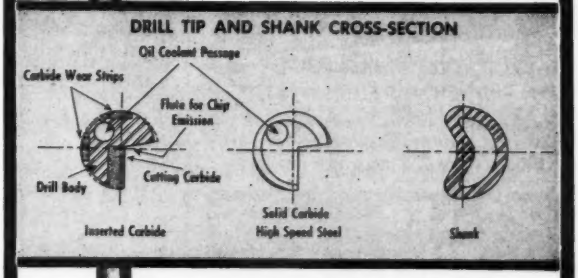
Production parts that once had to be drilled individually can now be gang-nested and drilled through, producing holes identical in size, location and finish. Drilling of this kind is done on automatic indexing machines, lathes, horizontal and upright drilling machines, and similar equipment. Forced oil feed through the drill clears chips and cools cutting edge for faster drilling. No matter what the size or shape of your workpiece, drilling with HI-STANDARD Gun Drills is an



outstanding time-and-money saver. Any material that can be *machined*, can be *gun-drilled*.

Gun drilling is one important way in which forward-thinking manufacturers are increasing production and cutting costs. To find out how your company can do the same, write for your Hi-Standard Engineering File 20 *today!*

*Also called "deep-hole drills"

Pioneers in the Design and Development of Gun Drills for more than 30 Years

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Roselle, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 1025

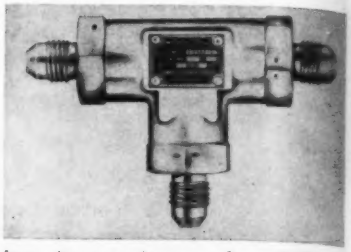
Product News

Press Hand

This adjustable press-mounted part extractor is completely self-contained and swings aside to allow convenient access to the die. A wide variety of grab jaws are available. Get details from Die & Automation Inc., 5353 Dixie Highway, Hamilton, Ohio, or Circle Inform-A-Gram No. P24.

Shuttle Valve

This new Model SV4 shuttle valve features a no-time-lag poppet and has an operating pressure of 3000 psi with a forged aluminum alloy body, and higher pressures with a stainless steel body. It's suited for hydraulic fluids or inert gases with operating temperatures of —65°F to +165°F. For data, write Marotta Valve Corp., Boonton Ave., Boonton, N.J., or Circle No. P26.

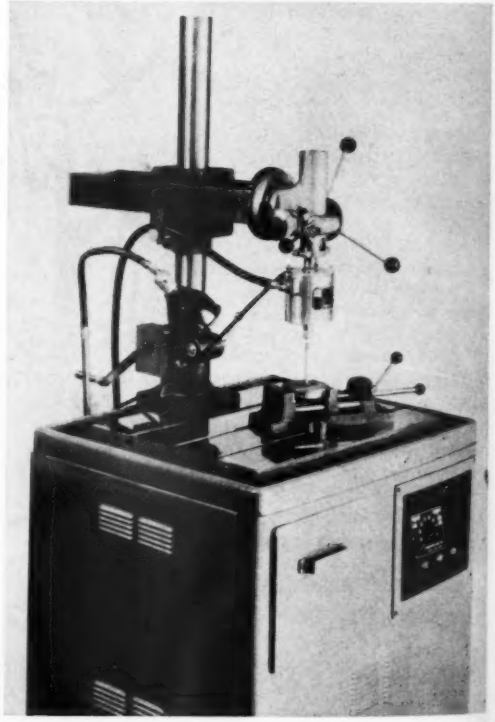


Cartridge Type Filter

This built-in cartridge type filter fits into moving parts such as quills and drillheads. Like other filters in the Tell-Tale line it has a dirt indicator and an automatic bypass. Get more information from The Rosaen Co., 1776 E. 9-Mile Rd., Hazel Park, Mich., or Circle Inform-A-Gram No. P27.

Disintegrating Machine

This new C-1 disintegrating machine cuts shaped holes in hardened metals and efficiently removes broken taps or drills without damage to the workpiece. Get more data from Jiffy Disintegrators, Inc., 1503 E. 11-Mile Rd., Royal Oak, Mich., or Circle Inform-A-Gram No. P25.



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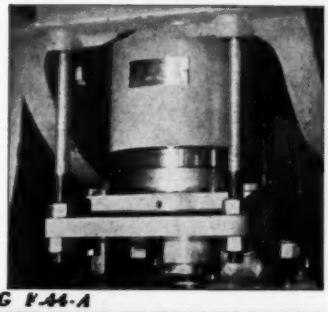

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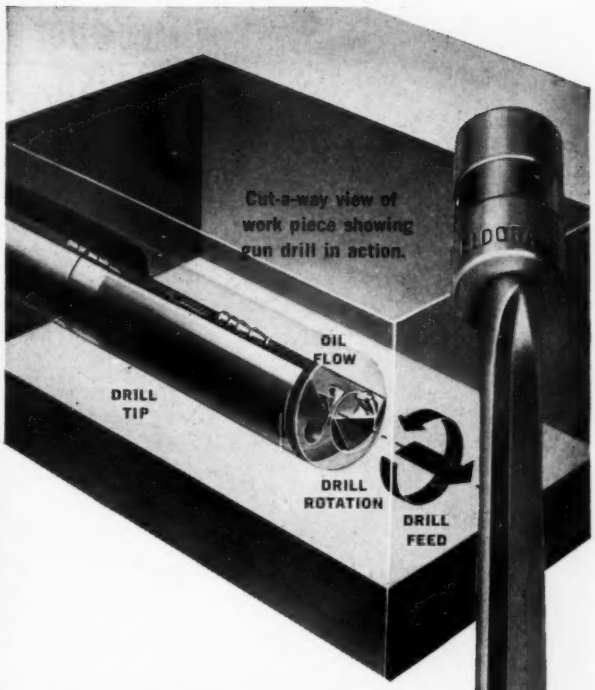

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O-M IMPROVED TIE-ROD HEAVY-DUTY HYDRAULIC (OIL) CYLINDERS 2000 PSI 3000 PSI NON-SHOCK MEET JIC STANDARDS BULLETIN 105A

MAINTAINING perfect piston rod alignment on thrust and return strokes is an engineering advantage of all O-M Air and Hydraulic Cylinders. But this is not the only reason why Design Engineers specify these components. For example, O-M Cylinders are all steel with bronze bearings . . . are cushioned to relieve piston shock . . . make full-power starts, and the length of each stroke can be held to the tolerance desired. In addition, O-M Cylinders can be mounted to deliver maximum performance in a horizontal, vertical or inclined position, and ports oriented to a convenient location.

These and many other advantages of O-M Cylinders are covered in our 1960 Bulletins with construction and dimensional details, engineering drawings, capacity chart and mounting data. For your copies, MAIL COUPON TODAY.

Bulletin 101A— Internal Key Tie-Rodless-Type Cylinders. Air 150 psi; Hydraulic up to 1500 psi.

Bulletin 105A—Improved Tie-Rod (Heavy Duty) Cylinders. Hydraulic 2000 psi; 3000 psi non-shock.

Bulletin 107—Automation (Heavy Duty) Air Cylinder for 200 psi operation.

Bulletin 108—Automation (Heavy Duty) Hydraulic Cylinder—for 1000 psi operation.

All O-M Cylinders are available in 1½" to 8" bores with standard or heavy-duty rods. Complete line of mounts and interchangeable parts. Immediate delivery on most sizes. **MAIL COUPON TODAY**

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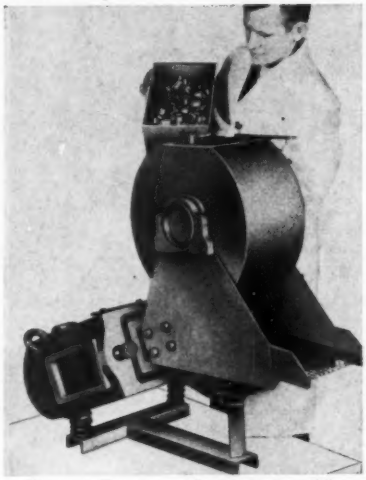
CIRCLE INFORM-A-GRAM KEY NO. 1041

Product News

Vibratory Barrel Tumbler

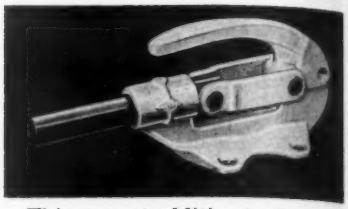


New vibratory barrel tumblers have electromagnetic vibratory drives for deburring, cleaning, and descaling. Constant, though variable, vibration assures more thorough working of hard-to-reach places. Barrel capacities of 0.4, 1, and 6 cu ft are available. Get brochures from Syntron Co., 341 Lexington Ave., Homer City, Pa., or Circle Inform-A-Gram No. P28.

Machine Key Bars

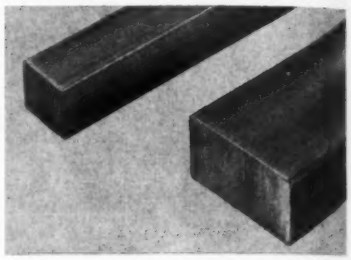
Zinc coated cold drawn steel Mak-A-Key bars are made oversize on both dimensions to eliminate chatter and backlash. They come in 12" to 12¼" lengths and can be easily cut, filed, and fitted to the keyway. For details write DeVan-Johnson Co., 500 Rathbone Ave., Aurora, Ill., or Circle No. P29.

Push-Pull Clamp



This newest addition to the Wespo line of push-pull clamps locks in both the push and pull positions. Over-all length of the Model 250 is 11¼", and over-all height in forward locked position is 4¾". Get data from Wespo Div'n, Vlier Engineering Corp., 26935 W. 7-Mile Rd., Detroit 19, or Circle Inform-A-Gram No. P30.

New Sizes of Wear Strips



Two new sizes of Meier Wearite, an extruded aluminum-bronze material used as wear strips, wear plates, strike plates, and lathe beds, are announced by Meier Brass and Aluminum Co., Hazel Park, Mich. They're ¾" x 1" in Alloy 4-11 and ⅜" x ½" in Alloy 4-13, bringing to 97 the stock sizes available. Ask for brochure; Circle Inform-A-Gram No. P31.

Canned Rubber Adhesive

Rubber in paste form is a high strength adhesive for metals, plastics, wood and other materials. The waterproof, fast-setting Devcon Rubber can be brushed on or squeezed from the can for caulking, insulating, gasket making, and general repair work. Get data from Devcon Corp., Danvers, Mass., or Circle Inform-A-Gram No. P32.

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COIL CAPACITIES 2,000 to 4,000 pound coils
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Standard motor driven Littell coil cradles feed 600 inches of stock per minute. Also built with Variable Speed Drives for infinite feed range of 100" to 600" per minute.

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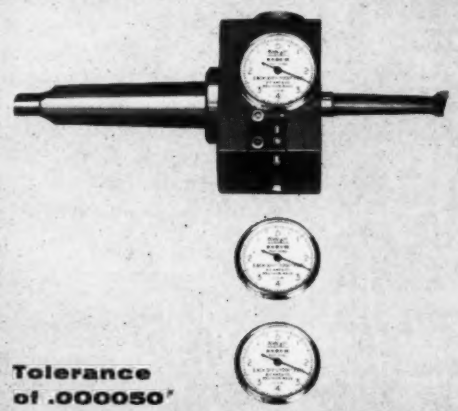

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Put your Bokum tool in the Bokumicro-Dial Boring Head*. For set-up, bore a hole a few thousandths undersize. Measure the hole and move the dial indicator (which moves the tool) to the exact reading you wish —you can read directly 50 millionths of an inch! You get absolute accuracy on production runs or tool room work. It's Bokumagic! Write today!

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*PATENT PENDING

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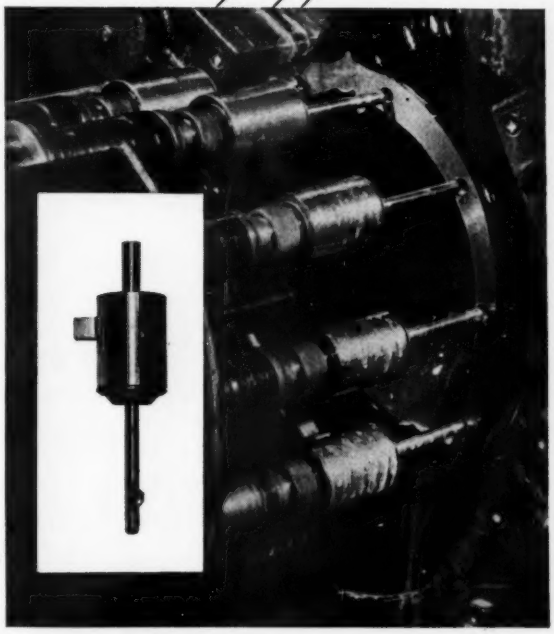
HOW TO DEBURR 10 HOLES IN A BANJO* AT ONE TIME!



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10 NOBURMATIC "H" tools *automatically* deburr *both* sides of holes in an **automobile "banjo" housing.* NOBURMATIC "H" is designed to *completely* deburr and chamfer the front and back faces of accessible *or* inaccessible holes. Ideal for mechanized or automated machine tools, the self-actuating NOBURMATIC "H" with its positive-action mechanism, not dependent on any spring setting, assures unmatched performance for the volume producer. Adaptable to manual usage in conventional drill presses and in-line drilling operations.

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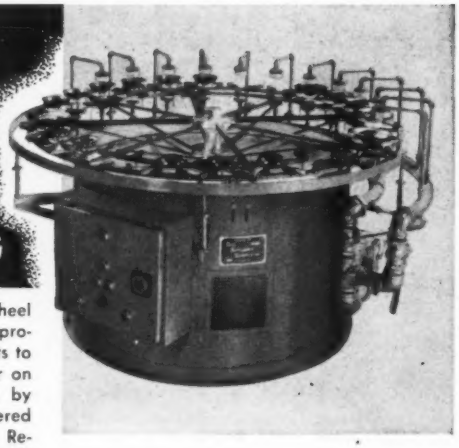
525% PRODUCTION INCREASE with AUTOMATIC SILVER SOLDERING



A prominent steel caster and wheel manufacturer has jumped his production from 80 arc-welded joints to 500 brazed joints per man hour on steel caster and wheel halves by changing over the G.A.S. engineered silver-brazing unit illustrated. Replacing copper brazing or arc welding, requiring skilled operators, the G.A.S. unit at this plant achieves these major advantages:

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- **Lower costs through more flexible operation**
- **Use of lighter gauge steel due to lower temperature brazing**
- **Semi-skilled operators**

The G.A.S. engineered silver-brazing unit, with variable speed drive, operates as a continuous or indexing unit, as desired. The height of the fixture table is adjustable.

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Heat Process Engineers
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Stops Losses making Dies and Templates

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With DYKEM Steel Blue | Without DYKEM Steel Blue

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CROSS SLIDE ROTARY TABLE

Has been cutting set-up time costs, improving precision in hundreds of DIE, MOLD and TOOL SHOPS. A profitable investment for your shop . . . investigate today.

Built Only by
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BENTON HARBOR, MICHIGAN

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all-new Producto VERSA TAP

TAP PERFECT HOLES— FAST!

- Rapid positioning over entire table area
- Floating tap finds true hole center
- Produces straight tapped holes

TOOLROOM EQUIPMENT DIVISION
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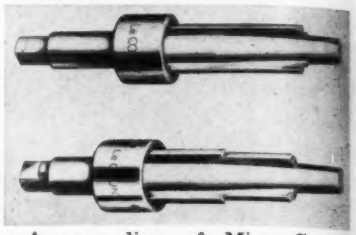
CIRCLE INFORM-A-GRAM KEY NO. 1064

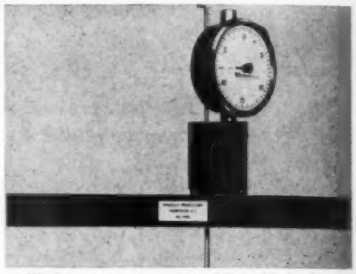
Product News

Precision Mandrels



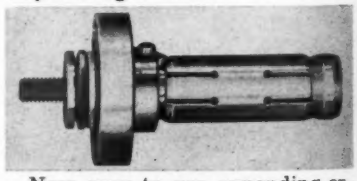
A new line of Micro-Centra 0.0001" tir guaranteed precision mandrels has been added by Le-Count Tool Works, Inc., 38 Cody St., West Hartford 10, Conn. Just 11 tools are needed for a range of 3/8" to 7" in the step-jaw type, and 14 tools are needed for a range of 3/8" x 3 1/4" in the straight-jaw type. For details contact the company, or Circle Inform-A-Gram No. P33.

Dial Depth Gage



This new adjustable dial depth gage features a reversible rod for checking depth or groove location. As many as four gages can be added to the indicator housing unit for multiple checking of depths and groove location. Write Versatility Products Corp., Box 1391, Poughkeepsie, N. Y., or Circle Inform-A-Gram No. P34.

Expanding Arbor

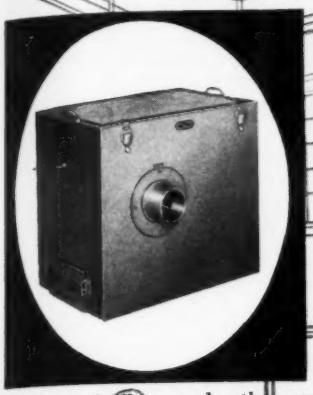


New easy-to-use expanding arbors have split-type sleeves for maximum gripping power. A special plastic in the grooves keeps chips, dust, and dirt from reaching the splines, shafts, and gears. Write LaSalle Machine Tool Inc., 3840 E. Outer Drive, Detroit 34, or Circle Inform-A-Gram No. P35.

DUSTKOP "520"

designed to collect dust from single machines

portable—easily installed



DUSTKOP STOPS DUST

Self-contained Dustkop models, like the "520," are practical and effective in collecting dust from single machines. They're designed specifically for service with surface grinders, tool and cutter grinders, offhand grinders, buffers and other small wheel equipment. These units are also easy to install — are actually portable — and very economical to operate.

Write for illustrated literature
46 models to choose from!

NEW DUSTKOP AUTO SHAKER shakes filters AUTOMATICALLY

AGET manufacturing company
1394 E. Church Street, Adrian, Michigan

ask for details

CIRCLE INFORM-A-GRAM KEY NO. 1071

NEW FLOOR MODEL A-F

Wilder MICRO-PROJECTOR with VERTICAL LIGHT BEAM

Quality Control plus Cost Control

- Completely versatile. For production inspection or as contour measuring projector.
- Choice of 3 measuring stages 1" x 1", 2" x 2", 2" x 4".
- Full set of lenses between 10x and 100x magnification.
- Full length cabinet eliminates separate worktable.
- Detachable shelf optional.

Write for New 12 page catalog 357.

OPTO-METRIC TOOLS, INC.
137TP VARICK ST., NEW YORK 13, N.Y.

CIRCLE INFORM-A-GRAM KEY NO. 1073

Quick-change deal...

or production runs . . . drilling or tapping . . . you can't beat the profit-making performance designed and built into universal adjustable

U. S. DRILL HEADS

Style U Heads in 8 standard models—positive all-gear drive, shaved gears, anti-friction bearings, neoprene covered lubricated quick-change joints—smooth, quiet, accurate.

Slip Spindle Plates, replacing the adjustable brackets, may be jig-bored for more than one hole pattern.

Holding fixtures with guide bushing plates may be used for drilling two different workpieces at the same time.

US DRILL HEAD

Adjustable and Fixed Center Multiple Drilling Heads.
Individual Lead Screw Multiple Tapping Heads.

UNITED STATES DRILL HEAD CO.
BURNS STREET • CINCINNATI 4, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1072

WAIT! Save Money!
DO THAT JOB FASTER AND BETTER WITH A Severance MIDGET MILL!
Ask for a SEVERANCE catalog today! YOU'LL FIND IT DETAILED, WELL ILLUSTRATED, SUGGESTIVE AND INFORMATIVE. IT INCLUDES LOW REGRINDING PRICES
YES, A SEVERANCE MIDGET MILL MAY WELL SOLVE YOUR PROBLEM AND SAVE YOU MONEY, IF YOU MUST REMOVE GATES, FINS, AND RISERS; BREAK SHARP CORNERS AND EDGES; MACHINE CARBON; FINISH CASTINGS OF ANY MATERIAL; WORK FILLETS, RADII, AND GROOVES; DEBURR OIL HOLES; BLEND WELDED AND ASSEMBLED PARTS; REMOVE FLASH; SMOOTH WELD BEADS; OR ANY OTHER SIMILAR OPERATIONS
MANY STANDARD SHAPES & SIZES TO CHOOSE FROM
SPECIAL SHAPES & SIZES AVAILABLE ON SHORT NOTICE
Severance MIDGET MILL SET NO. 77
SEVERANCE MIDGET MILL SET NO. 77, IS A POPULAR SET OF 1/2" DIAMETER, 1/4" SHANK, HIGH SPEED MIDGET MILLS. MAKES A FINE GET-ACQUAINTED-SET AND WILL COVER A BIG MAJORITY OF YOUR NEEDS FOR THIS TYPE TOOL. LEAFLET NO. 651 GIVES DETAILED INFORMATION AND PRICES. ASK FOR IT TODAY!
Severance TOOL INDUSTRIES INC.
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CARBIDE HAND FILES
REGRINDING
INSIDE DEBURRING CUTTERS
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HAND DEBURRING CUTTERS
TUBE END DEBURRING CUTTERS
CHATTER-FREE ECONO-SINKS
SPECIAL CUTTERS
MICRO-MILLS & BORE-MILLS
BALL SEAT REAMERS

CIRCLE INFORM-A-GRAM KEY NO. 1074

KNOW Your Sheet Metal Capabilities—

Check it with this Ductility Tester

This highly sensitive sheet metal tester takes specimens up to 1/16" thick, applies up to 30,000 lbs. pressure. The completely enclosed hydraulic system is directly driven by an electric motor. Both one and two gauge models are made.

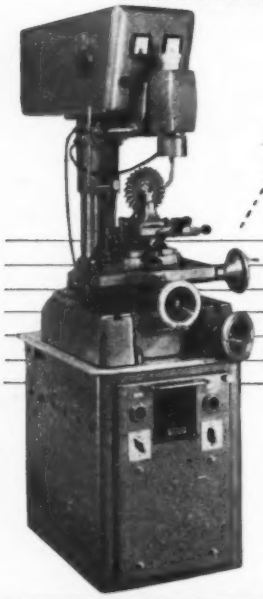
By turning one control, this machine grips the specimen, tests it, and releases it. Gripping pressure increases in proportion to test pressure. The test is made in full view and the results are read from the gauges' maximum indicator needles.

Write today for more information on ductility testing

DETROIT TESTING MACHINE COMPANY
9386 Grinnell Avenue, Detroit 13, Michigan

CIRCLE INFORM-A-GRAM KEY NO. 1081

Like to increase your cutting tool life up to 400% ?



Examples of increased tool life

Turning Tool, Single Point	250%
Spot Facing Tool	200%
Slitting Saw, 60 Teeth	400%
Punch and Die	300%
Reamer, 6 Flutes	50%
End Mill, 2 Flutes	75%

Ask for 12 page bulletin "Sparcard"

Hardness and wear resistance of tungsten carbide are combined with toughness and resilience of high speed steel.

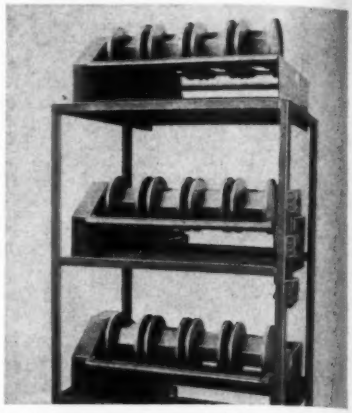
New Sparcard machine deposits and bonds carbide on tool surface by electrical discharge.

EASCO PRODUCTS P.O. BOX 587 YPSILANTI, MICH.
CANADIAN REP.....B.S.A. TOOLS LTD., TORONTO

CIRCLE INFORM-A-GRAM KEY NO. 1082

Product News

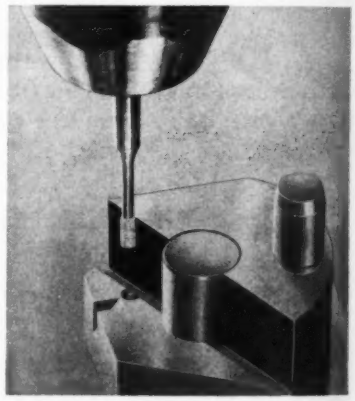
Finishing Machine



A compact, portable finishing machine, Model RA4 Rollabrader, is for small parts work and handles four 2-qt barrels at one time. Barrels lift out from the neoprene drive rollers, permitting loading of extra barrels while others are processed. Get data from Rampe Mfg. Co., 14915 Woodworth Ave., Cleveland 10, or Circle Inform-A-Gram No. P36.

New Diamond Mandrel

Precision grinding of holes as small as 0.022" can be done rapidly with this new diamond mandrel. It's used on jig grinders and precision internal grinders, and is ideal for carbide drawing and header dies. Write Precision Diamond Tool Co., P. O. Box 274, Elgin, Ill., or Circle Inform-A-Gram No. P37.



BUY U.S. SAVINGS BONDS TODAY!

CARBIDE SCREW MACHINE TOOLING HEADQUARTERS
BOOTH #454

#1000
DISPOSABLE-TIP BORING BAR
Stocked in 6 popular sizes

see these new CRAFTS TOOLS AT THE PRODUCTION ENGINEERING SHOW
NAVY PIER — BOOTH 454

#1005-9
MECHANICAL TOOL HOLDER
3/8" Square — 15° Shear.
5 styles R. or L. Hand.

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DISPOSABLE CARBIDE SCREW-TIP BORING BAR
For 1/4" dia. holes — and up

#1004
CIRCULAR FORM TOOL SHARPENING FIXTURE
See it in action at the Show.

#1014
DIAMOND COMMUTATOR TURNING TOOL.
Speeds Production — saves money.

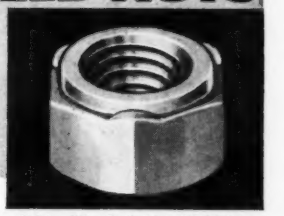
ARTHUR A. CRAFTS CO., Inc. • 603 Newbury Street • Boston, Mass.

CIRCLE INFORM-A-GRAM KEY NO. 1091

These 2 WELD NUTS for blind assemblies will give you

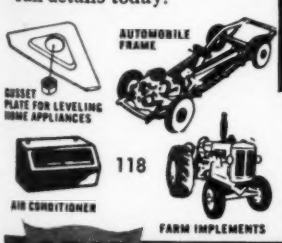
- Easier Positioning
- Quicker Fastening
- Extra Threaded Depth at
- Less Cost

Available with or without Gripco locking feature. Three weld projections on bottom of nut provide a firm non-rocking electrical connection during welding. Write for samples and full details today.



Gripco Pilot-Projection Weld Nut, circular pilot designed, provides quick, easy positioning of nut in bolt hole for instant resistant welding. No jigs, no fumbling, no waste of time. Weld spatter can not foul threads. Two heights for different metal gauges.

Gripco Countersunk Weld Nut eliminates time-wasting retapping of nuts after welding. Exclusive countersunk nut bottom eliminates fouling of threads by weld spatter. No time wasting false starts, no cleaning of damaged threads, nut ready to receive bolt immediately.

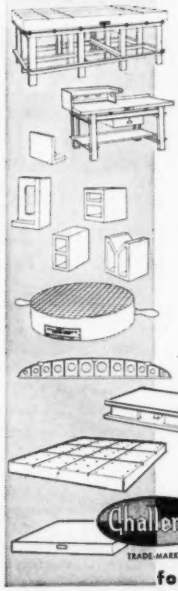


GRIP NUT COMPANY
107 Maple Ave. • South Whitley, Ind.

CIRCLE INFORM-A-GRAM KEY NO. 1092

need to hold CLOSER TOLERANCES?

HERE ARE OVER 300 AIDS to PRECISION PRODUCTION



More than 300 different items are available in the Challenge Precision Surface Equipment line to help you maintain close control of accuracy in your tooling, manufacturing assembly and inspection operations.

These include both Granite and Meehanite Surface Plates of all types and sizes. Also Meehanite Angle Plates, V-Block, and many other items of precision surface equipment. In addition, many special sizes and types can be made-to-order.

Take this important step toward cutting costs and minimizing rejects. Get information on Challenge Precision Surface Equipment to improve your operations.

SEND FOR THIS HANDY FREE CATALOG covering description and prices on all standard items.

THE CHALLENGE MACHINERY CO.
GRAND HAVEN, MICHIGAN

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challenge
PRECISION SURFACES
for LAYOUT • INSPECTION • ASSEMBLY

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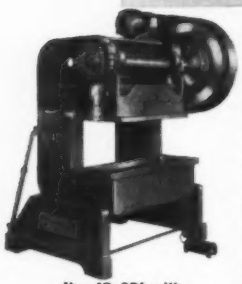
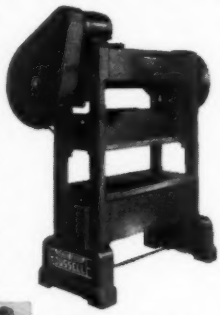
High-Output with ROUSSELLE

DOUBLE-CRANK PRESSES



No. 4B OBI with "Econo-Air" clutch.

SPEED UP PRODUCTION with these versatile 40-ton presses. Large bed and ram areas make them ideally suited to handle wide rolls or sheets . . . do multiple punching, steel-rule die work and other high output operations. For rapid, shockless starting and stopping, presses can be equipped with electrically controlled "Econo-Air" friction clutch . . . Ask for new catalog.



STRAIGHT SIDE — Die space up to 24 in.; bed space up to 6 ft. between uprights.

Choice of over 30 models and types in 5 to 60-ton sizes

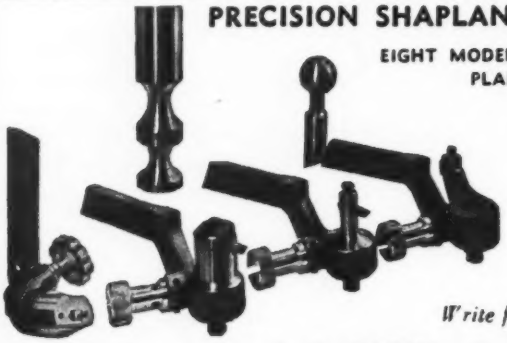
SERVICE MACHINE COMPANY
Mfrs. of Rousselle Presses
2310 WEST 78TH STREET • CHICAGO 20, ILLINOIS

Rousselle Presses are sold exclusively through Leading Machinery Dealers.

CIRCLE INFORM-A-GRAM KEY NO. 1101

PRECISION SHAPLANE RADIUS TOOLS

EIGHT MODELS FOR LATHES, SHAPERS, PLANERS AND BORING MILLS



Range: 3/8" to 3" for concave radii on lathes. Two sizes for convex radii (Balls up to 2½" dia.) on lathes. Also heavy duty model for radii to 6" on planers, etc.

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Patent Pending

C. B. TEETER - Tool Room Specialties

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CIRCLE INFORM-A-GRAM KEY NO. 1102

MODEL PDM **RICE MILWAUKEE**

PUNCH and DIE MAKER

The Complete Low-Cost Answer to Your Larger Die-Making Problems

- ★ Tilting Power Ram Permits Working from *Level* Table
- ★ Infinitely Variable Speed Transmission and Stroke Mechanism
- ★ Files Supported in both Upper and Lower Chuck . . . or in either
- ★ Saws to Center of 22½" Circle with Overarm, 28" with overarm removed
- ★ 20" square table — Special table available in 24" x 28" size

Send for PDM Bulletin, also Bulletins on Rice — Milwaukee Complete line of bench type Die Filers and Profile Grinders.

RICE PUMP & MACHINE COMPANY

228 PARK AVENUE BELGIUM WISCONSIN

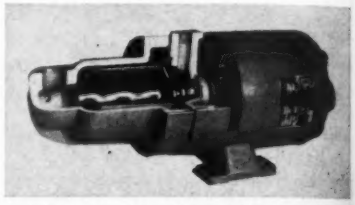
CIRCLE INFORM-A-GRAM KEY NO. 1103

Product News

Power Quills

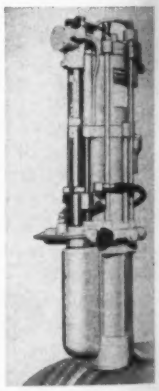
A new line of Super Cycle power quills is announced by Precise Products Corp., 3715 Blue River Rd., Racine, Wisc. They run at constant speed under load in a range from 7200 to 54,000 rpm with power output at the chuck available up to 2 hp. Get details from the company, or Circle Inform-A-Gram No. P38.

Coolant Pumps



The new PresSure Kool coolant pump's helical screw rotor turns in a stator to insure positive delivery of coolants at constant pressures. Several delivery lines can operate simultaneously under differing, but constant, pressures. Write to Products Div'n, Associated Engineers, Inc., P. O. Box 1628, Springfield, Mass., or Circle Inform-A-Gram No. P39.

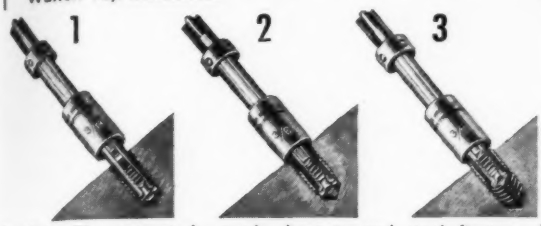
High Production Drill Feed



This automatic drill feed fits on any drill press to permit accurate high production automatic drilling, tapping, reaming, and threading. It's air-operated and hydraulically - controlled. Fast approach and drilling depth and speed are dial-set. Write General Tool Div'n, General Fire Extinguisher Corp., 8740 Washington Blvd., Culver City, Calif., or Circle Inform-A-Gram No. P40.

A Specialized Tap Extracting *Tool that will stop small cost leaks in Metalworking*

How much time do you waste removing broken taps? How many expensive parts are damaged or scrapped? Much of this time, and the parts, can be salvaged with Walton Tap Extractors.



1. The extractor's sturdy, heat treated steel fingers slip into the flutes of the broken tap.
2. The extractor is pushed down until it touches the broken tap, and the sleeve placed firmly in contact with the work.
3. With a tap wrench (not shown) applied to the square end of the extractor, the broken tap is simply and easily backed out.

No annealing or drilling. The broken tap is removed without delay . . . . *and without damaging the threads.* Furnished for 2, 3, 4, 5, 6, flute styles, in sizes No. 4 to 1½". Try them at our expense (free trial) in your shop.

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THE WALTON CO. HARTFORD 10, CONN.

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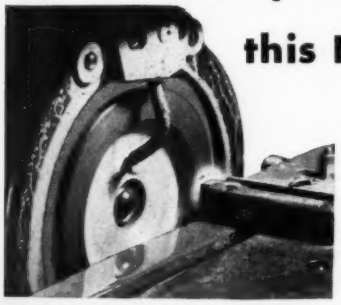

this NEW **A.I.T.** "E-2" Diamond Wheel for...

ELECTROLYTIC GRINDING

The exclusive "E-2" bond in A.I.T. diamond wheels has been developed specifically to guarantee that you get the FULL VALUE out of Electrolytic grinding of carbides. We can prove this in YOUR plant, on YOUR grinders, with these results:

1. **Wheel pre-run to eliminate break-in time in YOUR plant.**
2. **Faster stock removal.**
3. **High peak removal for longer intervals**
4. **Longer wheel life.**
5. **Less corrosive action**
6. **Specially designed wheel to reduce weight and distribute electrolyte efficiently**

Remember, to get these FULL VALUE results, be sure to send for complete test data today. 101

A.I.T. Diamond Tool co. 8217 N. KIMBALL AVE. SKOKIE, ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 1112

Self Centering BORE GAGE

WITH SUPER SENSITIVE GAGING HEAD made by Mahr

Will Repeat within 50 millionths of an inch

THIS PRECISION INSTRUMENT IS AN INEXPENSIVE, ACCURATE AND DEPENDABLE

INTERNAL COMPARATOR

READING DIRECTLY IN 50 MILLIONTHS OF AN INCH

SMALL BORE GAGES	With interchangeable, springloaded Split Jaw Measuring Heads	
	Range .059" to .160"	$88.50
	" .160" to .280"	72.50
	" .280" to .400"	72.50
LARGER SIZES	Employing a springloaded bridge, as illustrated	
	Range .400" to .700"	$72.50
	" .700" to 1.400"	67.50
	" 1.400" to 2.400"	67.50

Complete in Hardwood case, without gaging head. Extra for gaging head reading in .000050" . . . $37.50 which may be interchanged in the various sets. Other heads reading in 20 millionths or .0005" available.

OTHER SIZES BORE GAGES | Up to 32" in diameter and 88" hole depth

The most COMPLETE Line of BORE GAGES

- PRECISION COMPARATOR STAND for checking of mass-produced small parts
- RIGHT-ANGLE BORE GAGES for hard-to-measure places.
- Tungsten carbide tipping of extensions and contact points.
- Extensions for deep bores up to 88"

GUARANTEED (Mahr) QUALITY

AT YOUR FAVORITE SUPPLY-HOUSE OR WRITE TO

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Industry's NEWEST Production TOOL

MOLYKOTE® G LUBRICANT

- ALMOST 100% SAFETY AGAINST GALLING AND SEIZING WITH ALL BEARING METAL COMBINATIONS
- ELIMINATES STICK-SLIP, METAL PICK-UP AND DISTORTION IN PRESS FITTING
- REDUCES WEAR-IN TIME AND DAMAGE IN NEW OR REBUILT MACHINERY
- THE HIGHER THE LOADS, THE GREATER THE MARGIN OF SUPERIORITY OF MOLYKOTE G

Write for your free sample of MOLYKOTE G LUBRICANT today. We will also send you a copy of our new Bulletin 126 which gives complete details. THE ALPHA-MOLYKOTE CORPORATION, 65 Harvard Avenue, Stamford, Conn. Phone Fireside 8-3724. Plants in Stamford, Conn., Munich, Germany and Strasbourg, France.

THE ALPHA-MOLYKOTE CORP.
65 Harvard Ave., Stamford, Conn.
Please send me a free sample of your MOLYKOTE G Lubricant.

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Core Drill: 25 sizes from 1½" to 3" dia. in H.S.S.

C'sink, Style "B": 6 sizes from ⅝" to 2" dia. in H.S.S.

C'bore, Style "B": 32 sizes from 7/16" to 3" dia. in H.S.S. and carbide.

stub taper drive makes a difference in tool cost

Scully-Jones counterbores, countersinks, and core drills with stub taper drive reduce tooling costs three ways. Replacement cost is lower because these tools have two parts—a cutter with stub shank and a driver. Only the cutter is replaced when worn out. The tough, hardened steel holder can be reused time after time.

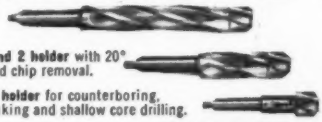
They save indirect costs, too, because short, yet rigid and accurate, stub taper shanks are easy to insert and eject. They speed setup and tool change. When countersinking follows core drilling or counterboring, you simply switch cutters—in seconds—the holder stays in the machine.

Other savings come from elimination of cutter damage and scrap. The tang on the stub taper shank mates with a slot in the holder—provides a positive, slipproof drive.

For complete information on this unique tooling method, see your Scully-Jones distributor or representative, *or* phone: BIshop 7-5900.

Scully-Jones and Company

1913 South Rockwell Street, Chicago 8, Illinois



Styles 1 and 2 holder with 20° flutes to aid chip removal.

Style "B" holder for counterboring, countersinking and shallow core drilling.

SCULLY JONES CUTTING TOOLS

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C.I. HAND KNOBS

PRONG

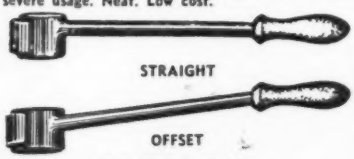
SCALLOPED

Made in Prong and Scalloped as shown and in Long Shank with wrench hexagon.

REID TOOL ROOM ACCESSORIES, HIGH QUALITY LOW PRICES!

MALLEABLE MACHINE HANDLES

Made in straight and offset types as shown and in crank types. Withstands severe usage. Neat. Low cost.



STRAIGHT

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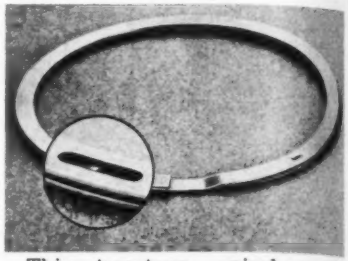
CIRCLE INFORM-A-GRAM KEY NO. 1122

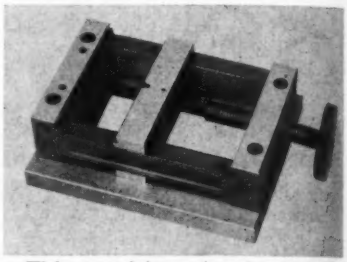
Product News

Self-Locking Rings



This two-turn, spiral-wound, self-locking Spirolox retaining ring has two slots and two punched "tangs" which lock when centrifugal force is applied due to high speed rotation, or when dirt tends to force the ring out of its groove. Get free samples and specification manual from Ramsey Corp., Box 513, St. Louis 66, or Circle No. P41.

Precision Vise



This precision vise for holding small work has stepped jaws, eliminating the need for parallels. A vertical vee-groove in the sliding jaw securely holds round work. Data is available from Linley Brothers Co., 682 State St. Extension, Bridgeport 1, Conn., or Circle Inform-A-Gram No. P42.

Injection Oiler

For use with low - volume, short-stroke air cylinders, the new Watts No. 608 injection oiler fits in the pressure line between the control valve and cylinder. It sends oil directly to the cylinder through a capillary tube within the cylinder air supply line. A kit is also available. Write to the Watts Regulator Co., Industrial Div'n, Embankment Rd., Lawrence, Mass., or Circle Inform-A-Gram No. P43.

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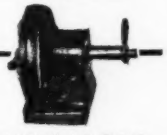

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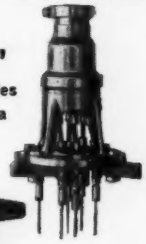
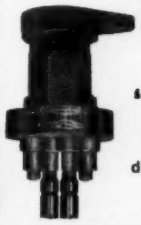


model "500"
2 to 6 spindles
drilling area to 18½"

model "3-22"
2 to 15 spindles
drilling area to 35½"



model "400"
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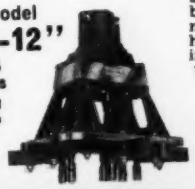

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Product News

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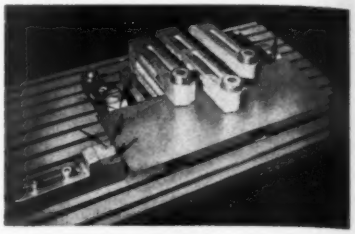
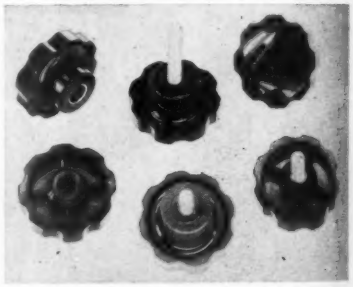
Magnetic Unipunch work stops insure accurate gaging and eliminate the need for holding the part against the stops during hole punching and notching operations.



They're mounted on templates, T-slotted plates, and press brake bed rails with Series A or B Unipunch hole punchers and notchers. For Catalog M, write Punch Products Corp., 370 Babcock St., Buffalo 6, N. Y., or Circle Inform-A-Gram No. P44.

New Plastic Knobs

These new molded plastic knobs and handwheels have large fluted grip for heavy-duty and high torque clamping devices, adjusting rods, valves, and regulators. They



are available with plain corded holes, tapped brass inserts, and protruding studs, or with reamed brass bushings and set screws. For samples and data, write Dimco-Gray Co., 207 E. Sixth St., Dayton 2, Ohio, or Circle Inform-A-Gram No. P45.

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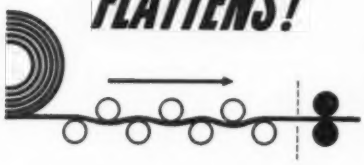

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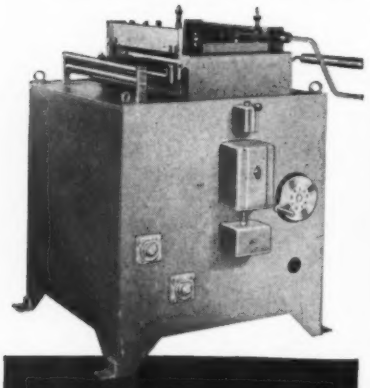

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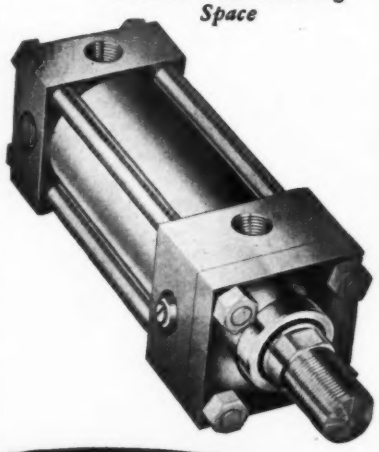

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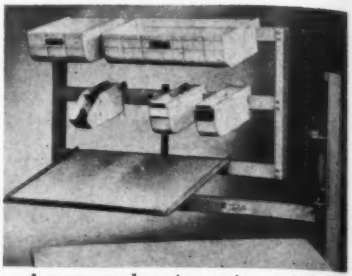
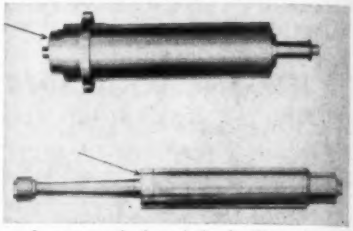
Product News

Parts Container Rack



A new rack gets parts containers off the assembly bench-top area and positions them for maximum operator efficiency. Parts containers can be hung on both sides of the swivel rack. For more information, write Products For Industry, Inc., 1530 Summer St., Stamford, Conn., or Circle No. P46.

Coolant Flinging Spindle



A concealed axial air flow flinger is now used in Pope internal grinding spindles to prevent coolant from entering the spindle bearings. The design of the precision spindles protects the operator from exposed high speed rotating end covers. Ask for Bulletin S-18 from the Pope Machinery Corp., 261 River St., Haverhill, Mass., or Circle Inform-A-Gram No. P47.

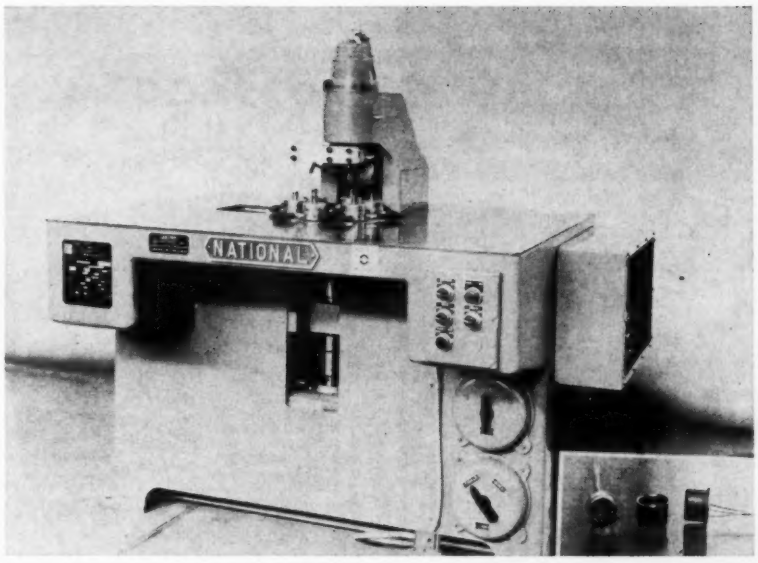
Tiny Control Valves

These subminiature directional control valves are only 1" thick and 1½ inch wide. Built especially for limited mounting space, the new Trim Line is ideal for controlling small cylinders and for operating diaphragms and pilot cylinders. Contact Hunt Valve Co., Salem, Ohio, or Circle Inform-A-Gram No. P48.

Product News

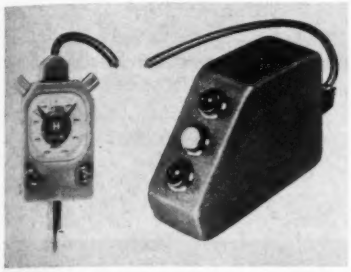
Automatic Welder

This versatile transistor welder developed by National Electric Welding Machines Co., Bay City, Mich., has an integral table to accommodate a standard dry box. The transformer is mounted in the base so the machine can be converted from single point to dial feed. It's rated at 2000 transistors/hr. Circle No. P49.



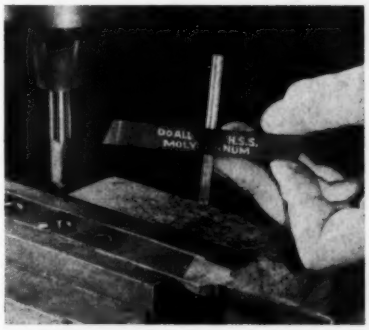
Out-Of-Tolerance Signal

An electric indicator which generates a signal in a light box whenever established tolerance limits are exceeded has been added to the Kwik-Chek gage line. The signal can be used to turn on lights or for automatic control. Get data from Industrial Div'n, Hamilton Watch Co., Lancaster, Pa., or Circle Inform-A-Gram No. P50.

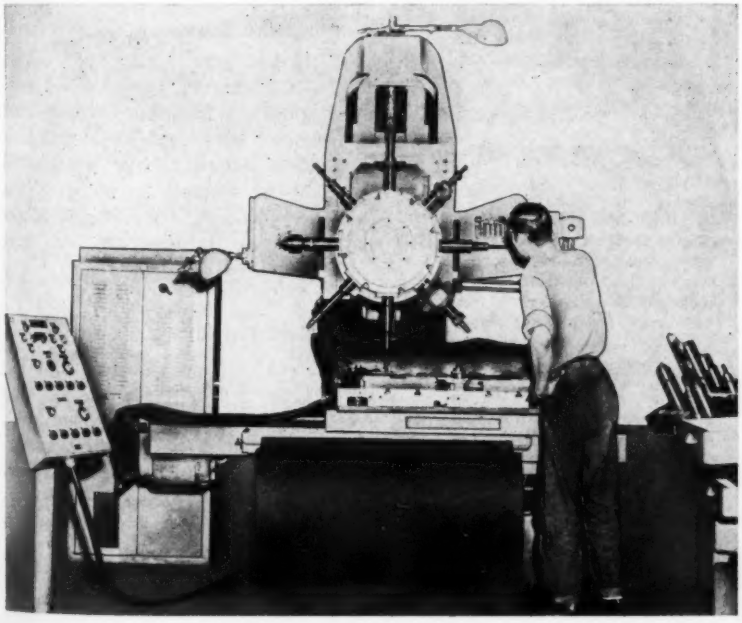


Drills Hardened Steel

New drills for hardened steel anneal the material at the drill point area as heavy pressure is applied, and remove a softened chip. They're not carbide, and can easily be resharpened or modified with an aluminum oxide wheel. Write The DoALL Co., Des Plaines, Ill., or Circle Inform-A-Gram No. P51.



Use the convenient Inform-A-Gram Card for quick inquiry service — following page 76



Reciprocating Feed

A new reciprocating feed arrangement, available as optional equipment for deep hole drilling on all automatic hydraulic and tape controlled Burgmaster turret drilling machines, permits drilling to a certain depth, retracting, and rapid traversing down to the previous stopping point of the drill. Write Burg Tool Mfg. Co., 15001 Figueroa St., Gardena, Calif., or Circle Inform-A-Gram No. P52.

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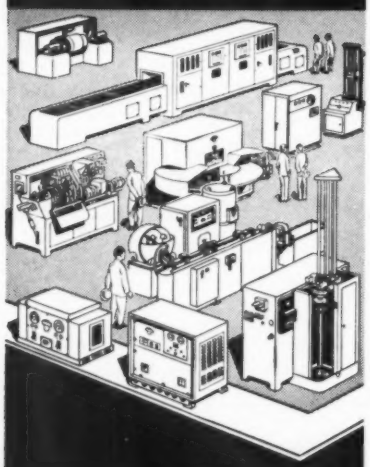

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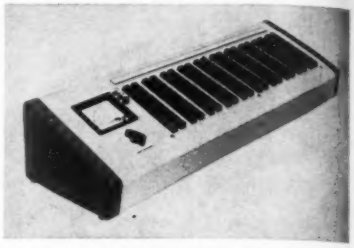
CIRCLE INFORM-A-GRAM KEY NO. 1183

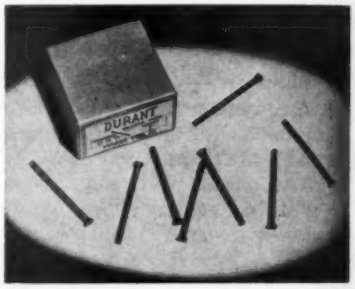
Product News

Quality Control Computer



This desk top computer gives an instantaneous solution to statistical quality control problems with an accuracy of better than 2%. The raw numerical data is fed into the computer by means of a conventional keyboard and mean value and standard deviations are immediately indicated on a large panel. Write Boonshaft and Fuchs Inc., Hatboro Industrial Park, Hatboro, Pa., or Circle Inform-A-Gram No. P53.

New Pin Sizes



Headed pins up to 1/4" dia in 2", 4", and 6" lengths are now available from the Durant Tool Co., 12 Thurbers Ave., Providence 5, R. I. All pins have a Rockwell C 58-60 honed finish with the heads left soft. For more information, write the company, or Circle Inform-A-Gram No. P54.

Bonds Anything

Metal, wood and other materials can be bonded or repaired with TwinWeld epoxy adhesive. It's quick-curing, permanent, doesn't expand or contract, and resists acids, alkalies, greases, and solvents. Get a free sample test kit from Fybrglas Industries, 3010 W. Montrose Ave., Chicago 18, or Circle Inform-A-Gram No. P55.

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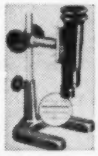

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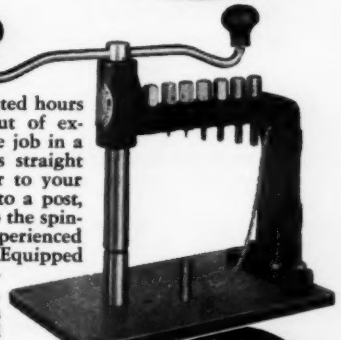

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Product News

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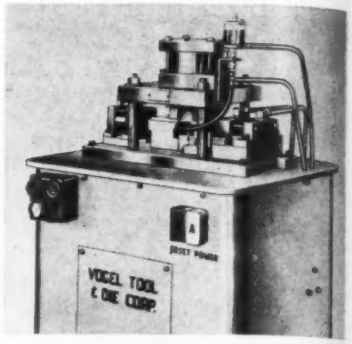

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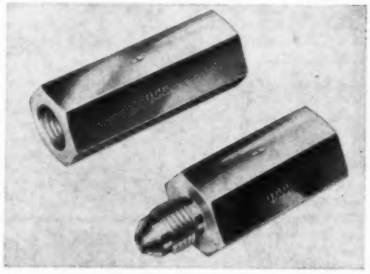

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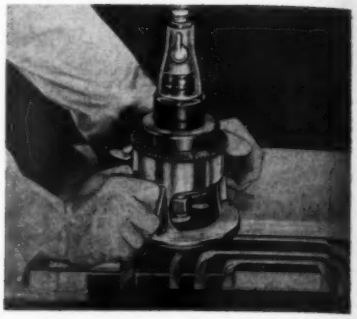

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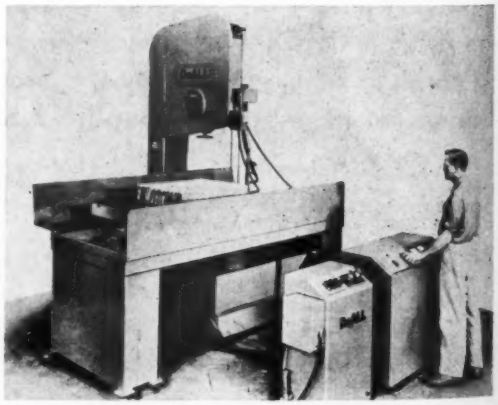

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Product News

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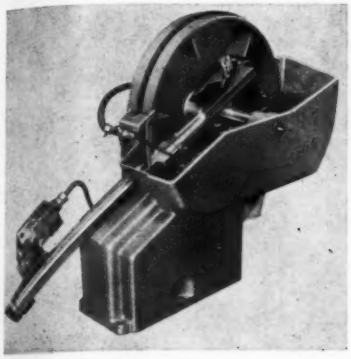

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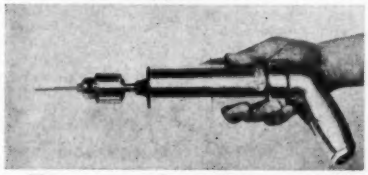

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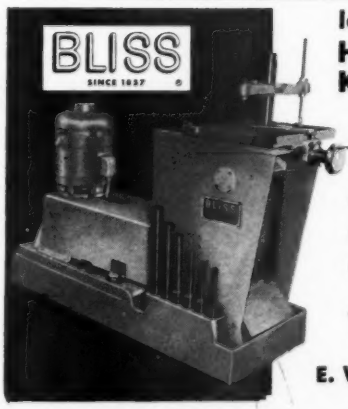

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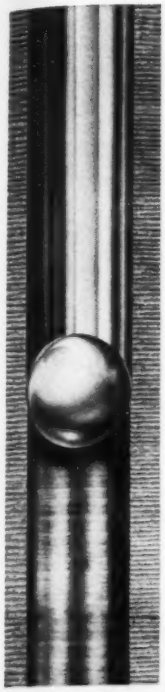

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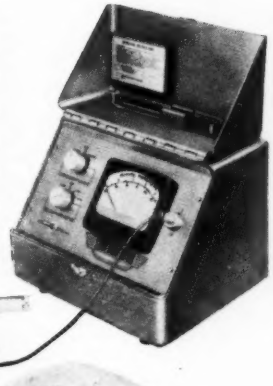

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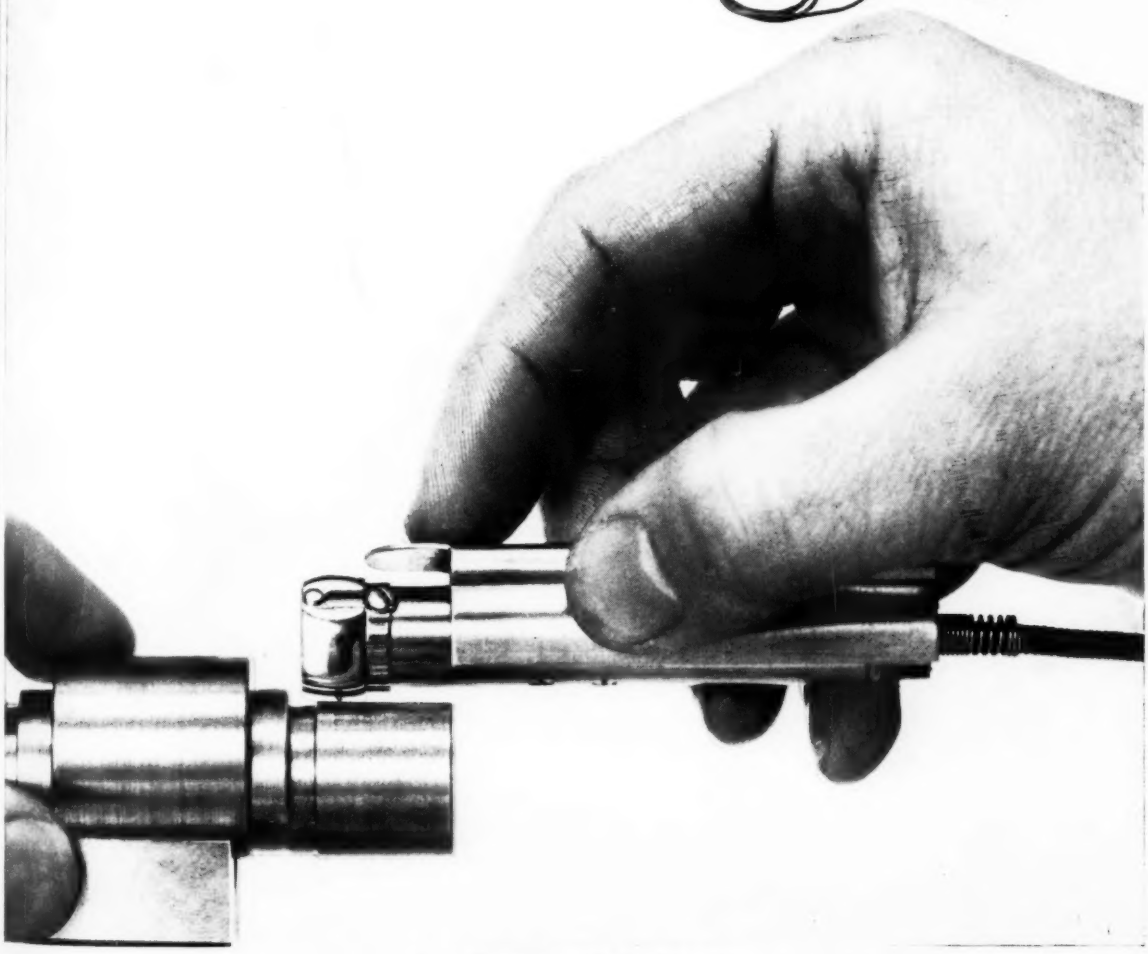

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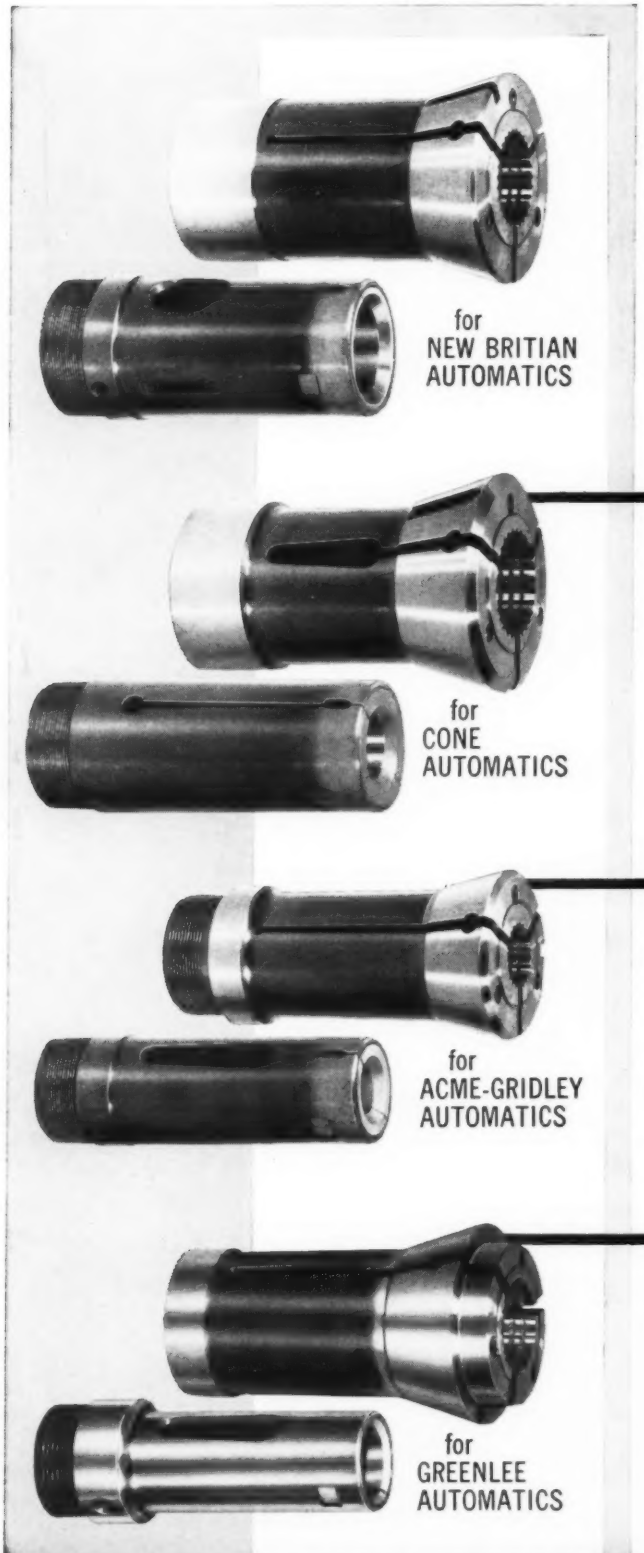

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